the OIL AND GAS JOURNAL

W7R – FIRST CHOICE FOR HARD ABRASIVE DRILLING

The popularity of Hughes "W7R" rock bits in hard abrasive areas is a matter of simple arithmetic. Their higher penetration rate and greater footage per bit mean more hole drilled faster . . . *and at a lower cost!*

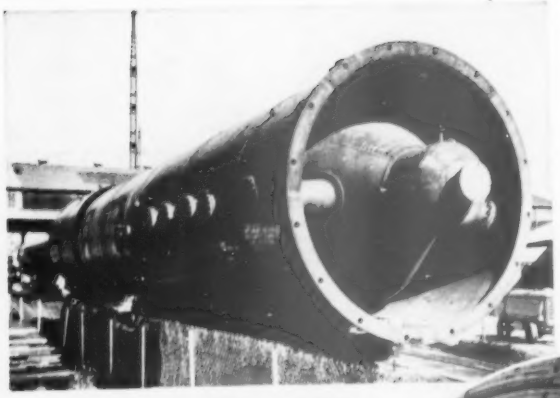
That's why – in West Texas, the mountain states, and wherever hard abrasive formations are encountered, requiring maximum gage fortification – you find more Hughes "W7R" bits being used on more rigs than all other makes combined.

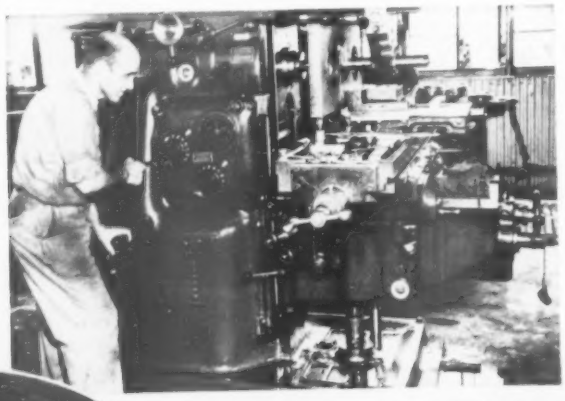
Experience gained in studying the performance of millions of bits in thousands of wells, over a period of more than 40 years, goes into every HUGHES bit.

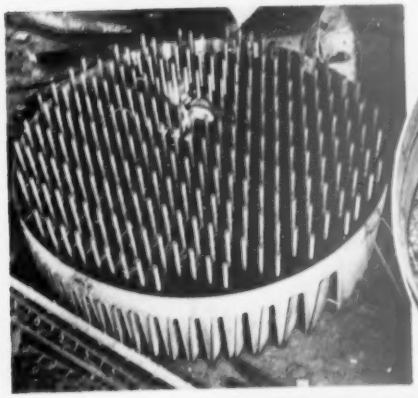
HUGHES TRI-CONE ROCK BITS

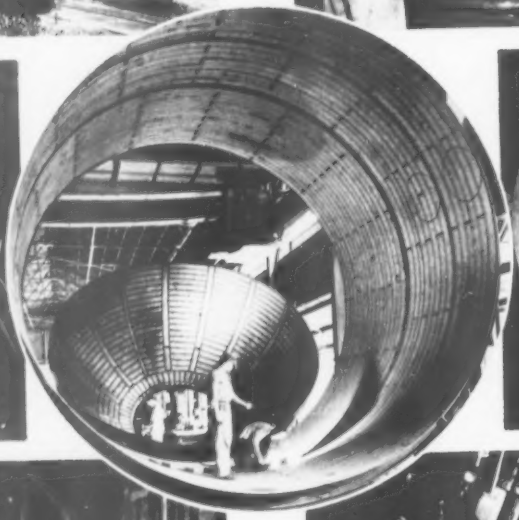
PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **JULY 6, 1953**

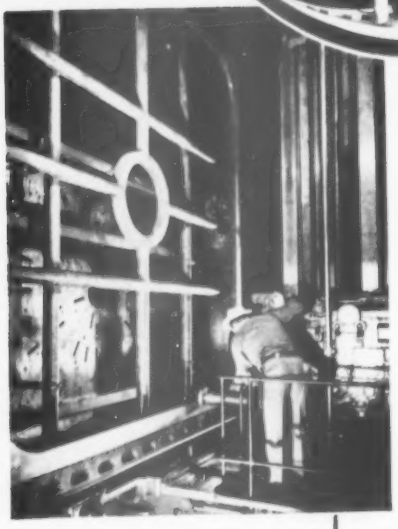
The Fine Art of Doing Things Well











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In Brief . . .

1. NEW SULFUR UNIT . . . Only three process vessels are required for the two-stage conversion of hydrogen sulfide to elemental sulfur in the new unit recently installed by Globe Oil & Refining Co. at its Lemont, Ill., refinery. Result is a compact plant assembly relatively simple to operate. Yields from the 13-ton-per-day unit are approximately 95 per cent of theoretical. Approximately 20,000 S.C.F.H. of acid gas is processed in the unit.

2. EXPLORATION TECHNIQUE . . . Automatic punched-card equipment is now being applied to data-reduction calculations encountered in the exploration for oil. While computations frequently involve a relatively small number of arithmetic operations for each data point, vast quantities of data may have to be analyzed. Punched-card equipment may produce greater accuracy, economy, and speed in this work. Techniques are useful in reduction of magnetic-field data, seismic data, and radio-positioning data.

3. DRILLING WITH AIR . . . Drilling with air or gas appears to offer advantages where formations do not tend to slough or contain appreciable amounts of water, and where one or more of the following conditions exists: (1) Severe loss of circulation; (2) producing formations are susceptible to injury from drilling fluid or particle penetration; (3) drilling fluid is expensive or nonavailable.

4. COMBUSTION DEPOSITS . . . Combustion-chamber deposits increase the octane number requirement of an engine either because they accelerate the reactions which lead to knock, or they ignite the air-fuel mixture, thus leading to uncontrolled combustion. In high-compression-ratio engines—7.5 to 1 or higher—these mechanisms are interrelated and are sometimes very difficult to distinguish.

5. TXL GAS LIFT . . . Continuous and intermittent injection of gas, four lifting depths, and both high-pressure well gas and compressed gas are all used by Shell Oil Co. in TXL field. Four different pay horizons being lifted vary in depth from near 6,000 to almost 10,000 ft. Present production ranges from less than 10 bbl. to more than 900 bbl. of fluid per well per day.

Why the Petroleum Industry Prefers HARTZELL Cooling Tower Fans

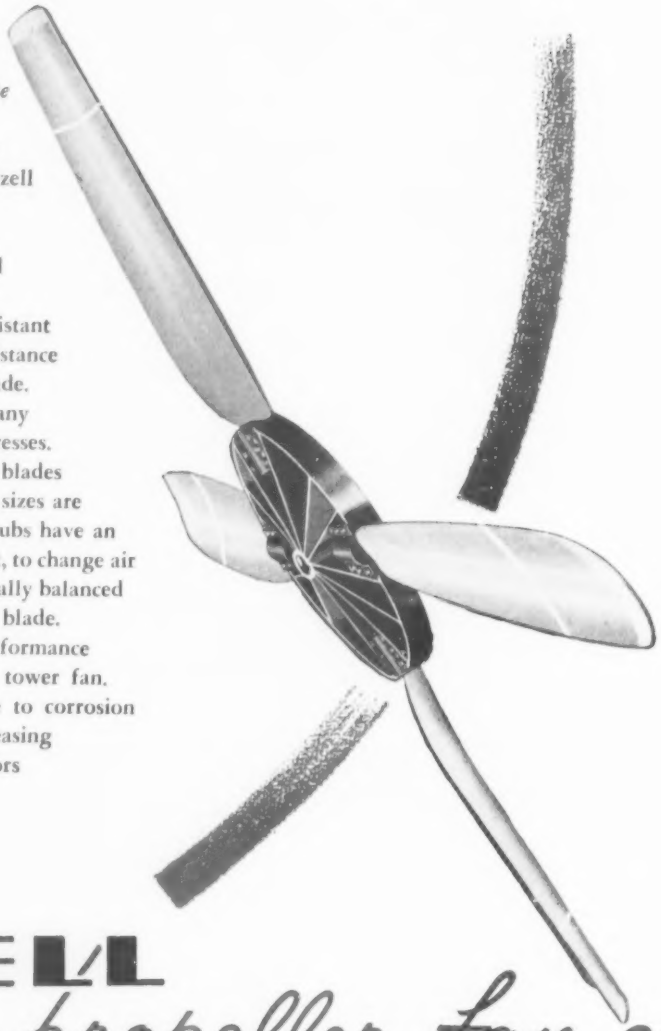
Nearly every Hartzell cooling tower fan installed since the introduction of the Hartzite plastic blade in 1941 is still in service. This proven dependability explains why the plant which has had experience with one Hartzell fan will almost invariably insist on more Hartzells as other fans need replacement.

Fabric-base Hartzite plastic was developed especially to meet the rugged requirements of the petroleum industry. It is unusually resistant to corrosion and abrasion. Durability and resistance to corrosion are constant throughout the blade. Hartzite absorbs vibration. Its strength is many times that necessary to withstand normal stresses.

Hartzell cooling tower fans with Hartzite blades are available in sizes from 10′ to 22′. Smaller sizes are made of aluminum alloy. The welded steel hubs have an extremely high safety factor. Blade adjustment, to change air delivery, is easily made. All hubs are dynamically balanced and all blades are balanced against a master blade.

You no longer have to rely on claims. Performance has proven that Hartzell makes *the* cooling tower fan. Recognition of Hartzell's superior resistance to corrosion and mechanical damage is found in the increasing frequency with which cooling tower operators specify simply "Hartzell fan."

Send for Bulletin 1503.



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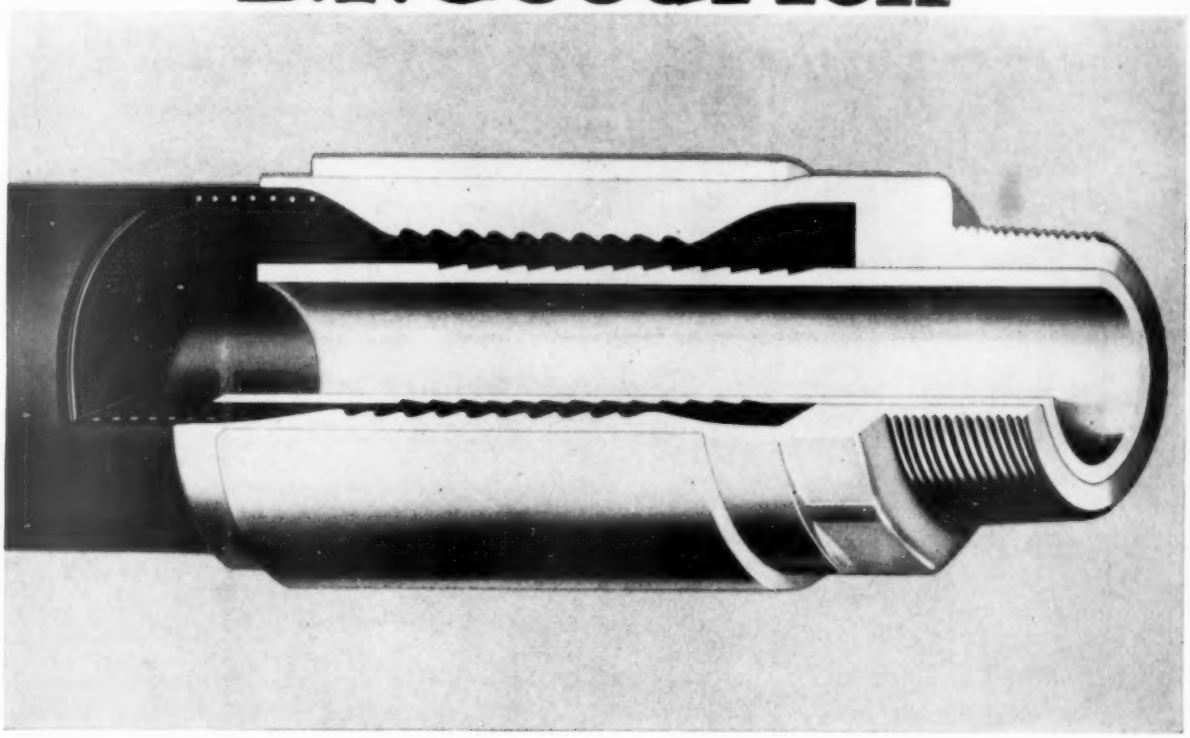

This guaranteed leakproof coupling has a bulldog's grip

No drilling pressure is high enough to put a leak in a B. F. Goodrich Permalock hose coupling—nor budge it even a fraction of an inch from the bulldog grip its teeth sink into the hose end.

Applied to rotary drilling hose under hydraulic pressure, the Permalock coupling is *permanently* secured by a powerful lock ring so it can never tear loose nor weaken.

This B. F. Goodrich Permalock coupling is shorter, too, adding only 30 lbs. per end—where long, built-in couplings add 80 lbs. That's 100 lbs. less to handle when coupling up.

Permalock's inside diameter is the same as the hose, allowing full flow at all times. Mud cannot wear out its special high-carbon steel lining. In fact, the whole coupling is guaranteed *for the life of the hose!*

B. F. Goodrich Highflex rotary drilling hose with Permalock couplings is available at leading supply houses in the major drilling areas, or you can get it anytime—day or night—from one of these B. F. Goodrich warehouses: Dallas, Houston, Kilgore, Odessa, Wichita Falls, Great Bend, Oklahoma City, Tulsa, Williston, Denver and Los Angeles.

If you would like further information on the Permalock coupling, hose, or any of the products B. F. Goodrich makes for the oil field, send the coupon below.

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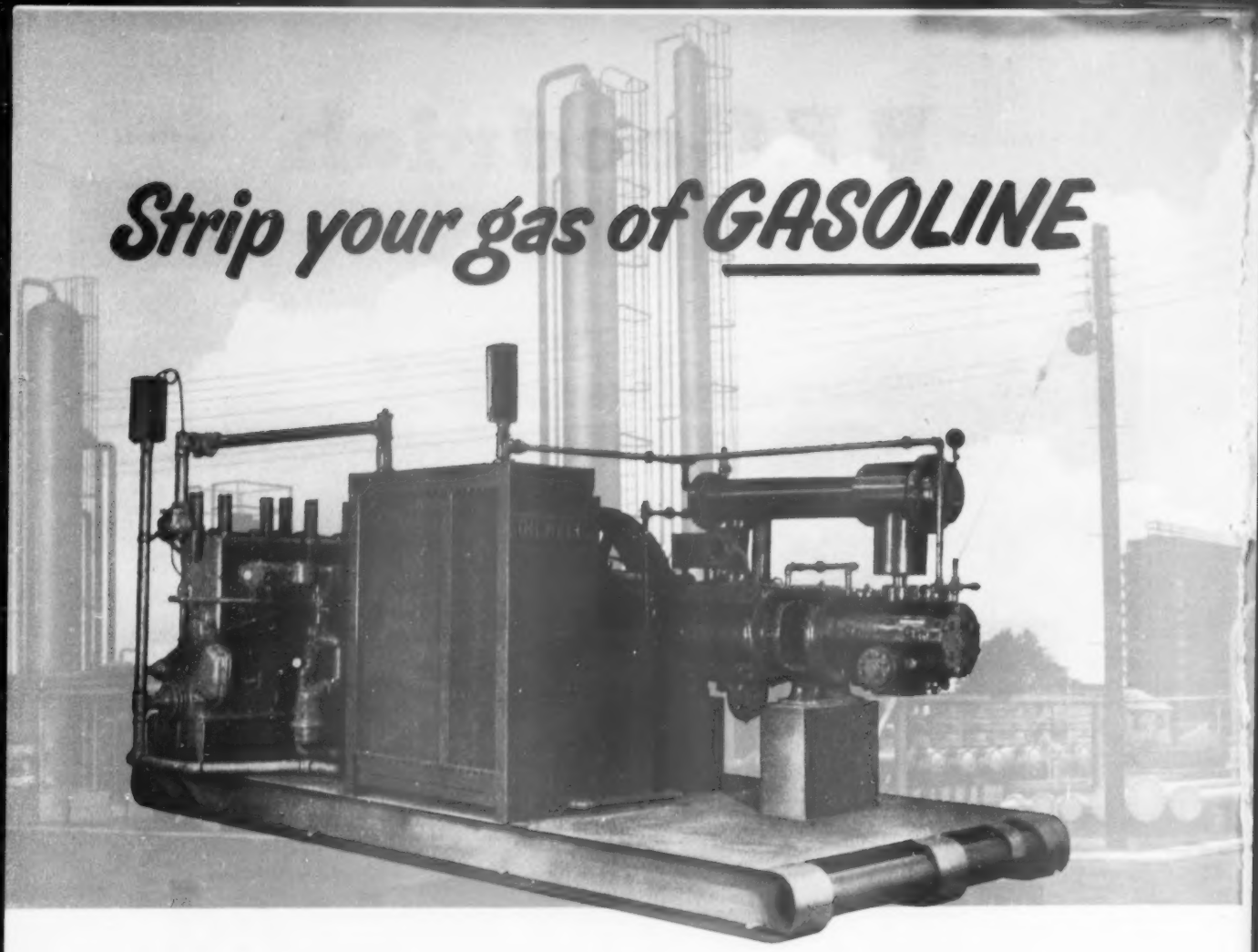

—with "Oilwell" Compressor Units

THESE Compressor Units are custom-made to meet your specific application requirements. Their heavy-duty construction, completeness-of-assemblies and conservative ratings result from "Oilwell's" many years' experience in engineering equipment of this type.

Single or multi-stage compressors are mounted on sturdy skid bases—suitable for inexpensive installations, with or without housing. Prime mover, together with adequate cooling systems, operating gauges, controls, etc. are all built-in and represent "balanced" components that will give dependable service with minimum maintenance.

Available in
25, 50, 75, 100, 125, 150 and 300-HP Sizes

THE "OILWELL" COMPRESSOR UNIT ILLUSTRATED is in the 150-HP range . . . with two-stage compressor capable of taking gas at 25 psi and compressing it to 650 psi at the rate of approximately 731,000 cubic-feet-per-24-hours. It has a split-type cooler with separate, closed cooling system for the compressor, independent of the one for the engine. This unit is powered by a model NKU Waukesha Engine.

Let your "Oilwell" representative . . .

. . . help analyze the factors involved in your gasoline-plant application and specify the "Oilwell" Compressor Unit best suited for your job . . . or write for Booklet No. 20-53.

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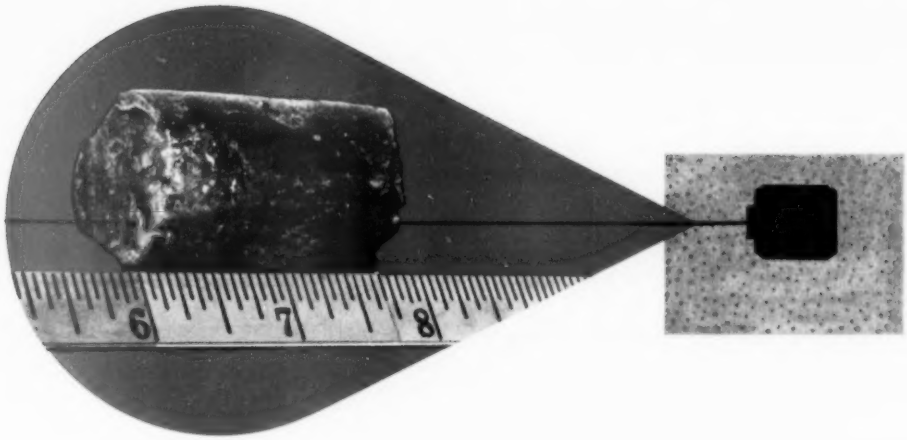

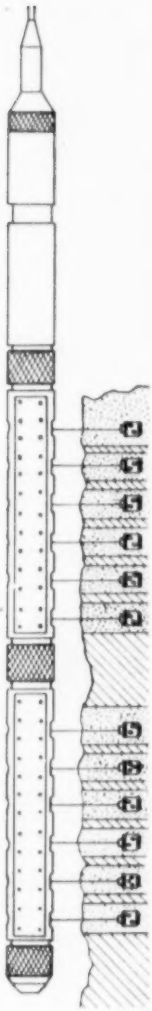

LARGER, CLEANER SAMPLES FOR MORE ACCURATE ANALYSIS!

HALLIBURTON'S SIDE WALL CORING

This tool's effectiveness in providing geologists with a high percentage of large, uncontaminated cores has become a strong factor in its growing use. Operators know these cleaner, undistorted cores allow more accurate analysis of downhole formations.

Halliburton's Side Wall Coring Tool is scoring this success for several additional reasons. A potential logging ring operated simultaneously with coring insures pinpoint positioning relative to the desired section. Operators not only get up to 80% recovery of these undistorted cores, but they get them from where they count. It means reduced rigtime; it means lower cost per core.

Other advantages afforded by Halliburton's Side Wall Coring Tool are its barrel – designed with front larger than the back for easy retrieving – and its cable with a breaking strength of 2000 pounds, making it possible to retrieve deeply buried barrels. Too, powder loads may be varied from 40 grains up to 110 grains to allow coring of hard formations, and a special barrel may be used in the same gun to core soft sands.

Size of these uncontaminated cores is an important point with geologists. And field records reveal that this effective 30-shot tool obtains core volumes that range from 1" O.D. by 1¼" length in hard formations to 1⅛" O.D. by 2" length in soft sands.

Your Halliburton representative can provide you with this service that allows more precise interpretation of subsurface formations. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

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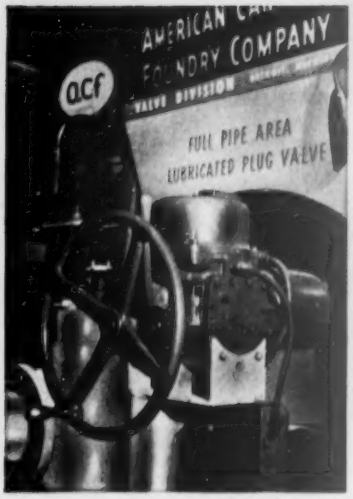
AT THE OIL SHOW IN TULSA

LIMITORQUE VALVE CONTROLS

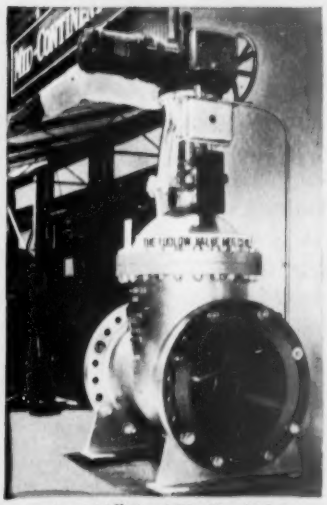
ON WORLD FAMOUS VALVES



A.C.F. 6" Lubricated Plug Valve

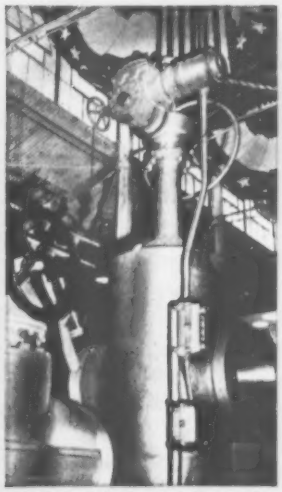
Darling 30" Steel Pipeline Valve

Nordstrom 6" Lubricated Plug Valve
Lunkenheimer 6" Steel Gate Valve

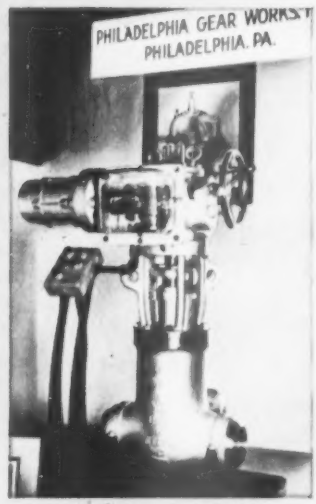


Ludlow 20" Steel Pipeline Valve

W.K.M. 30" Steel Pipeline Valve



Walworth 24" Pipeline Gate Valve



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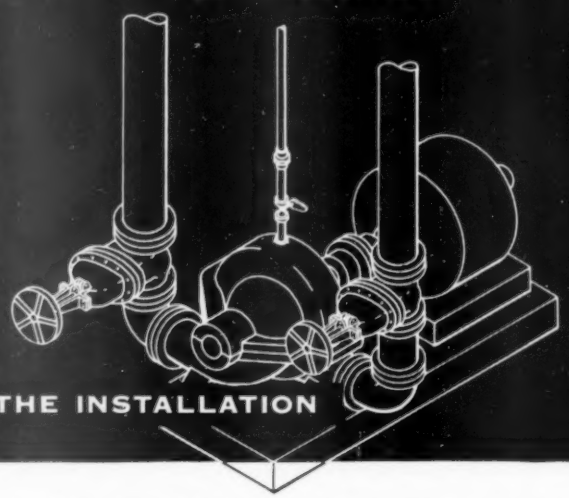

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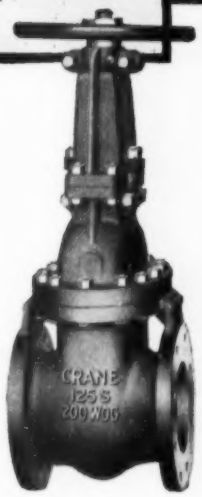
Originally the Crane valves were installed on belt-driven pumps when the plant was built in 1903. In 1952, the old pumps were replaced. Nearly all the Crane valves were found in good condition and put right back in service on the new pumps.

It's no easy job these Crane 6 and 8-inch, 125-pound brass-trimmed gate valves have been doing since 1903. The plant operates on 80-day continuous beet sugar campaigns. In spite of intermittent operation, and with periodic routine maintenance only, the Crane valves never fail to operate freely, smoothly, and seat tightly. For 50 years they have assured dependable, positive flow control in event of pump failure—and they're still doing it.

THE VALVE

Here is today's model of these "50-year service record" Crane 125-pound iron wedge gates. Still made to the most rigid quality standards, these modern valves keep building unusual performance records in every industry. They come in patterns for every need. See your Crane Catalog or your Crane Representative.



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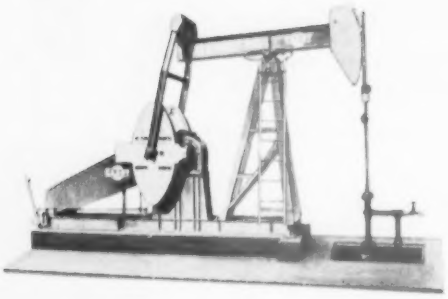

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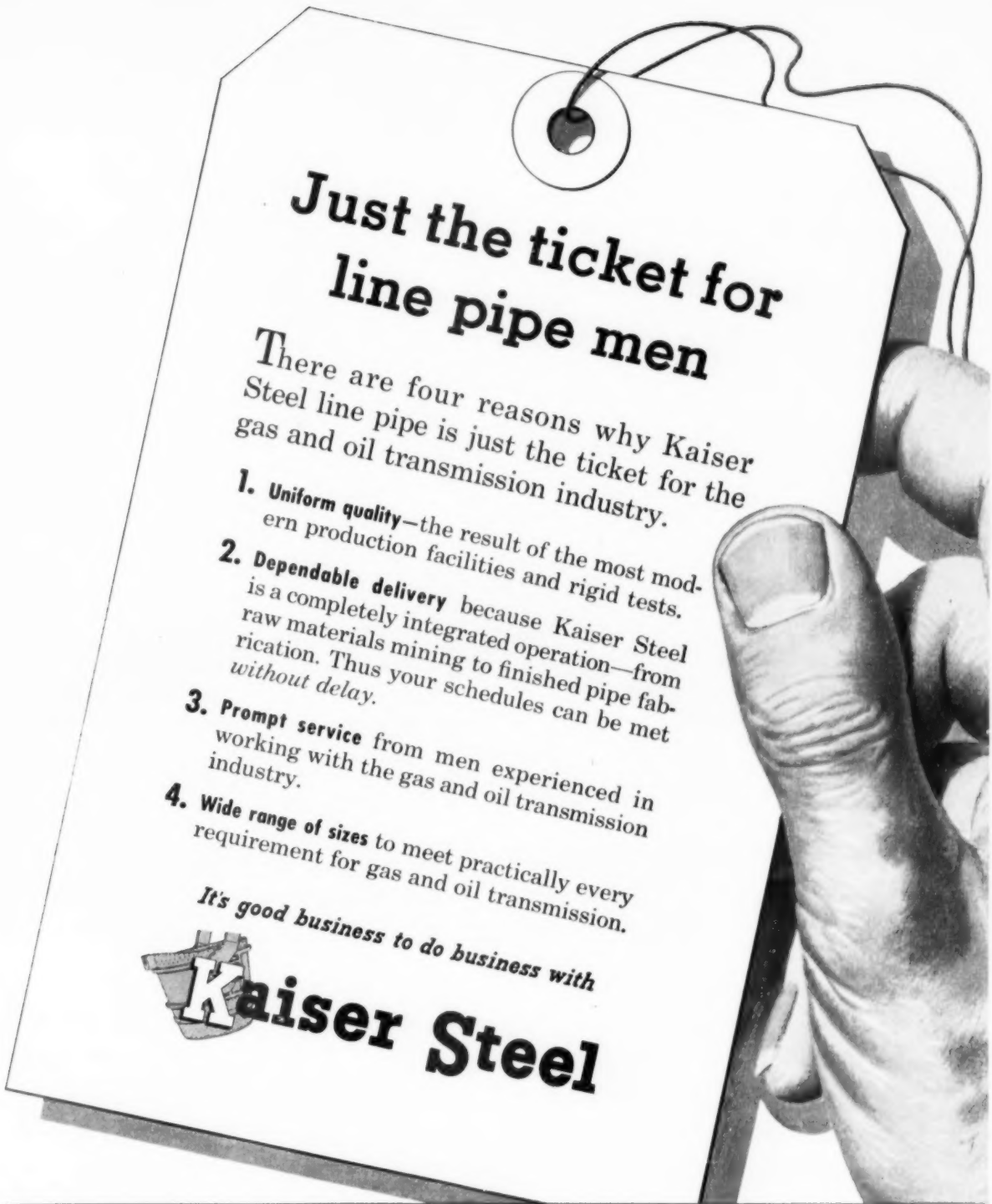
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Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

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CAT* EQUIPMENT DOES "THE BEST JOB IN THE LEAST AMOUNT OF TIME"

In abandoned Illinois oilfields, there is a known reserve of more than 500,000,000 barrels of oil. The Texas Co. has a project outside Centralia which will water-flood oil pools to recover this oil.

G. E. Tillman Co., Inc., Centralia, contractors, used two Caterpillar HT4 Shovels on the project. The versatile HT4 Shovels had the job of back-filling trenches and grading the pit. They also loaded steel, repaired roads and set 24" and 26" pipe.

"We depend on our Caterpillar equipment to do the best job in the least amount of time," said C. R. Beltz, superintendent, *"and we are never disappointed."*

A Caterpillar HT4 Shovel—the only tractor-shovel completely designed and built by one manufacturer—has its hard work built into it at the factory. Its girder type frame is cross braced to give it strength at the hinge point. Box section, all welded lift arms are cross braced to eliminate twisting. Its 80", 1¼ cubic yard bucket is wider than the widest part of the tractor, allowing the unit to cut sidewalls clean and work close to walls.

And, of course, the unit is powered by a trouble-free Caterpillar Diesel Engine. It's the engine that operates on inexpensive No. 2 furnace oil—and idles without fouling.

Combine this versatility, strength and economy with efficient day-and-night Caterpillar service and you have a unit that will really smash operating costs. Ask your Caterpillar Dealer for a demonstration on your job. And do it today.

Caterpillar Tractor Co., Peoria, Illinois.

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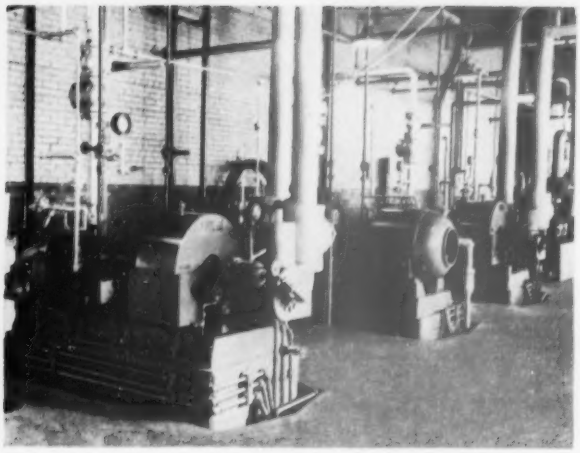
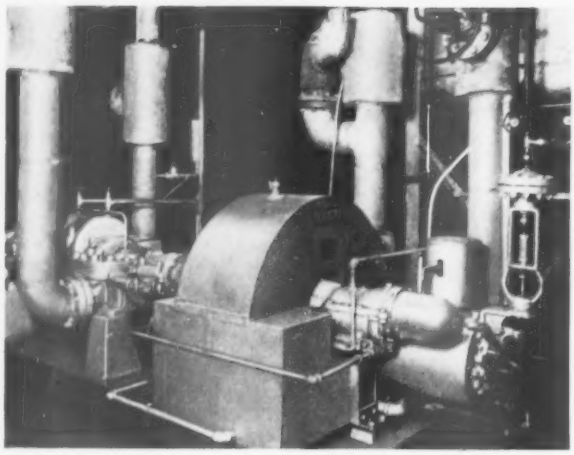
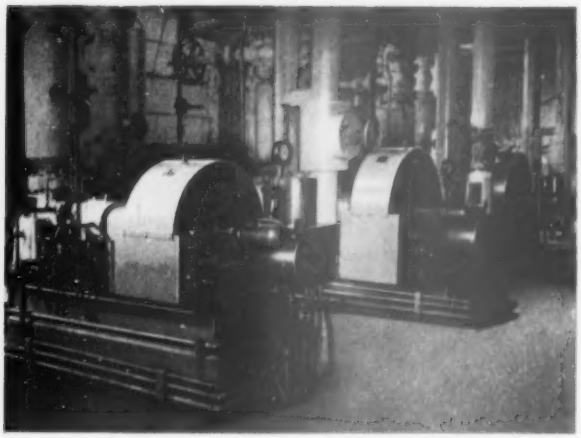
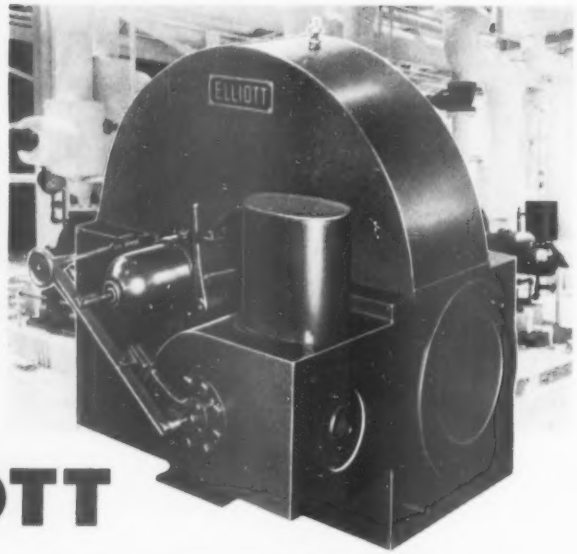




Because the Industry demands RELIABILITY





-everywhere ELLIOTT YR TURBINES

One plant may have a dozen—another, twenty or so—a third, sixty or more. When these turbines go into a plant, their simple maintenance, easy adaptability, and above all, their unquestioned reliability, soon result in repeat orders wherever plant requirements demand further mechanical drive units. "Put in Elliott turbines and forget your troubles" is the usual sound advice one plant manager gives another.

Consider too, the advantages of broad standardization in YR turbine parts, greatly reducing parts inventory. Using the same basic turbine, six different types of governors may be applied to any one of five different frame sizes. These turbines cover a range up to 2000 hp and 7000 rpm.

You can get the turbines you want in the YR line. See your local Elliott engineer or write Elliott Company, Jeannette, Pa.

ELLIOTT Company

STEAM TURBINE DEPARTMENT

H3-6

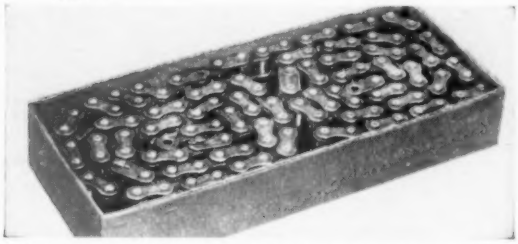
CHAIN ASSEMBLY...CHAIN REPAIR

THERE'S NOTHING TO IT!

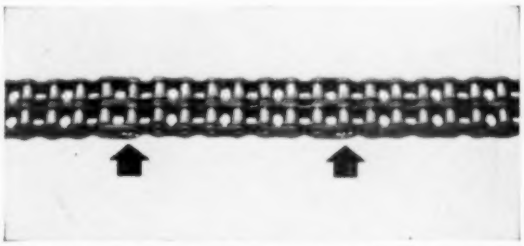
WITH IMPROVED BALDWIN ASSEMBLY RIVETED ROLLER CHAIN

When it comes to coupling, uncoupling or repair of roller chain either at the rig or in the supply store, the improved Baldwin Assembly is your time-saving, money-saving, trouble-saving, temper-saving answer. There's virtually nothing to it. Here's all you do:

TO TAKE THE CHAIN APART

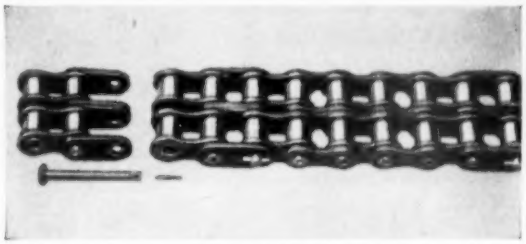


1 You buy Baldwin Assembly Chains in a packaged unit —a 10-foot strand in every box. Each chain is made up of sections of varying lengths joined by single coupler pins. Stretch out the assembled chain.



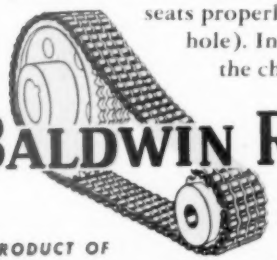
2 Locate and mark the coupler or couplers to be disconnected. Their distinctive straight edge side plates, locking pins and washer heads make them easy to locate.

3 Remove locking pin and drive flatted end of the coupler pin out of its side plate. Then tap it out the rest of the way with a drift pin. Before driving out the pin, back up the opposite side of chain with hammer or vise grip pliers to avoid springing the side plates.



4 That's how easy it is to take this chain apart. If a section you need is in the middle of the strand...just remove the coupler pin on either side of the section desired.

TO REASSEMBLE THE CHAIN. To couple this chain, just line up the free end of the coupler link with the adjacent roller link. Back up the link with hammer or vise grip pliers. Drive in the pin (being sure the flatted end seats properly in the flatted side plate hole). Insert the locking pin, and the chain is now reassembled.



BALDWIN REX ROLLER CHAINS

A PRODUCT OF

Chain Belt COMPANY OF MILWAUKEE

It will pay you to investigate the Improved Baldwin Assembly. You'll find it will simplify your chain problems and save you real money. Ask about it at your supply store or use the coupon to send for Bulletin 52-3. Baldwin Rex Oil Field Sales Offices located in New York • Tulsa • Dallas • Houston • Midland • Los Angeles.

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Please send me Bulletin 52-3.

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Company.....

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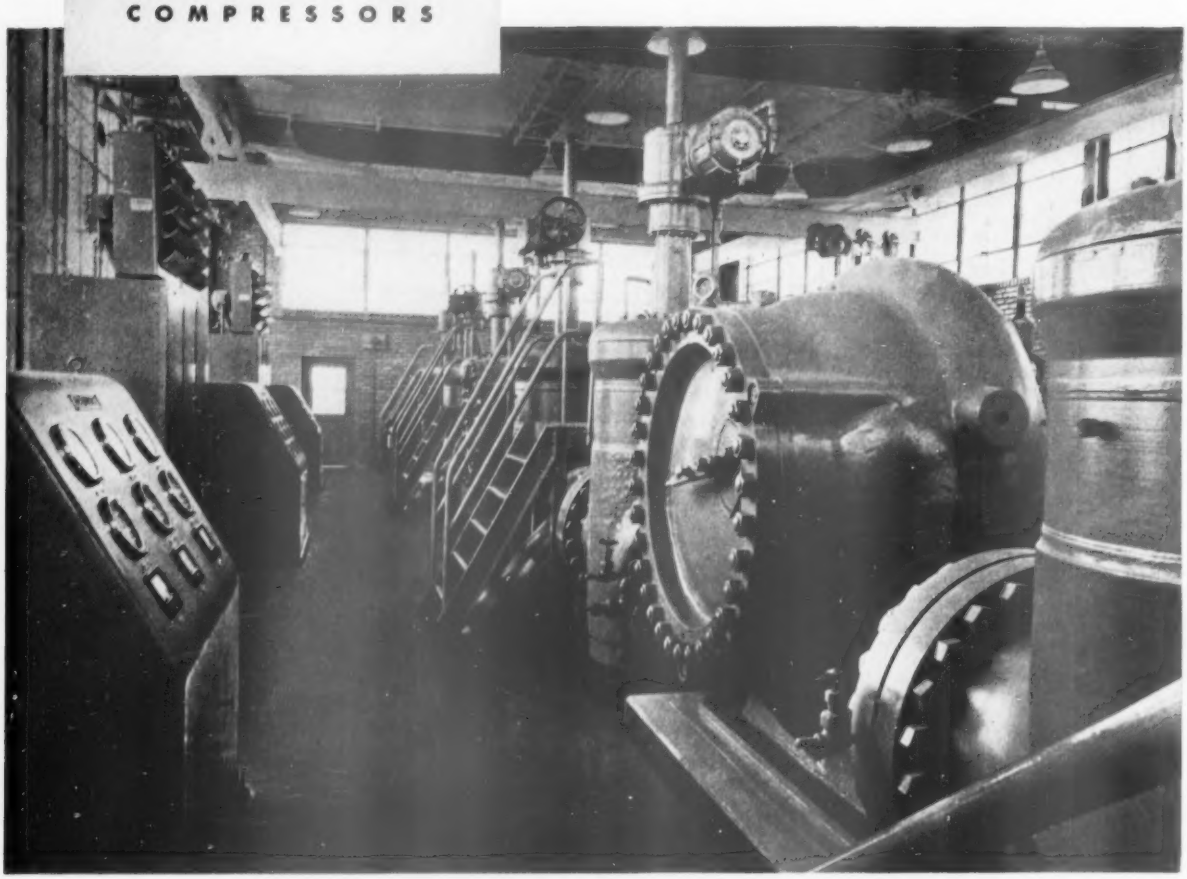
DE LAVAL
CENTRIFUGAL COMPRESSORS

on the job at Texas Eastern



The centrifugal compressors on Texas Eastern Transmission Corporation's new 30-inch gas pipeline from Kosciusko, Mississippi, to Uniontown, Pennsylvania, are all De Laval.

Thirteen De Laval compressors will be installed in stations at Barton, Alabama; Gladeville, Tennessee (shown above); and at Wheelersburg and Berne, Ohio. Each station will be equipped with three 2,500 horsepower motor-driven compressors, except Berne, which will have four.

One of the outstanding engineering features of these compressors is the effective use of inlet guide vanes. This De Laval feature provides greater operating flexibility than has been previously possible with constant speed motor-driven units.

Once again De Laval engineering has led the way in developing better centrifugal compressors for natural gas transmission. If you want to know more about the advantages of De Laval centrifugal compressors—consult our engineers. They will be glad to give you the benefit of our wide experience on the major gas pipelines using centrifugals.

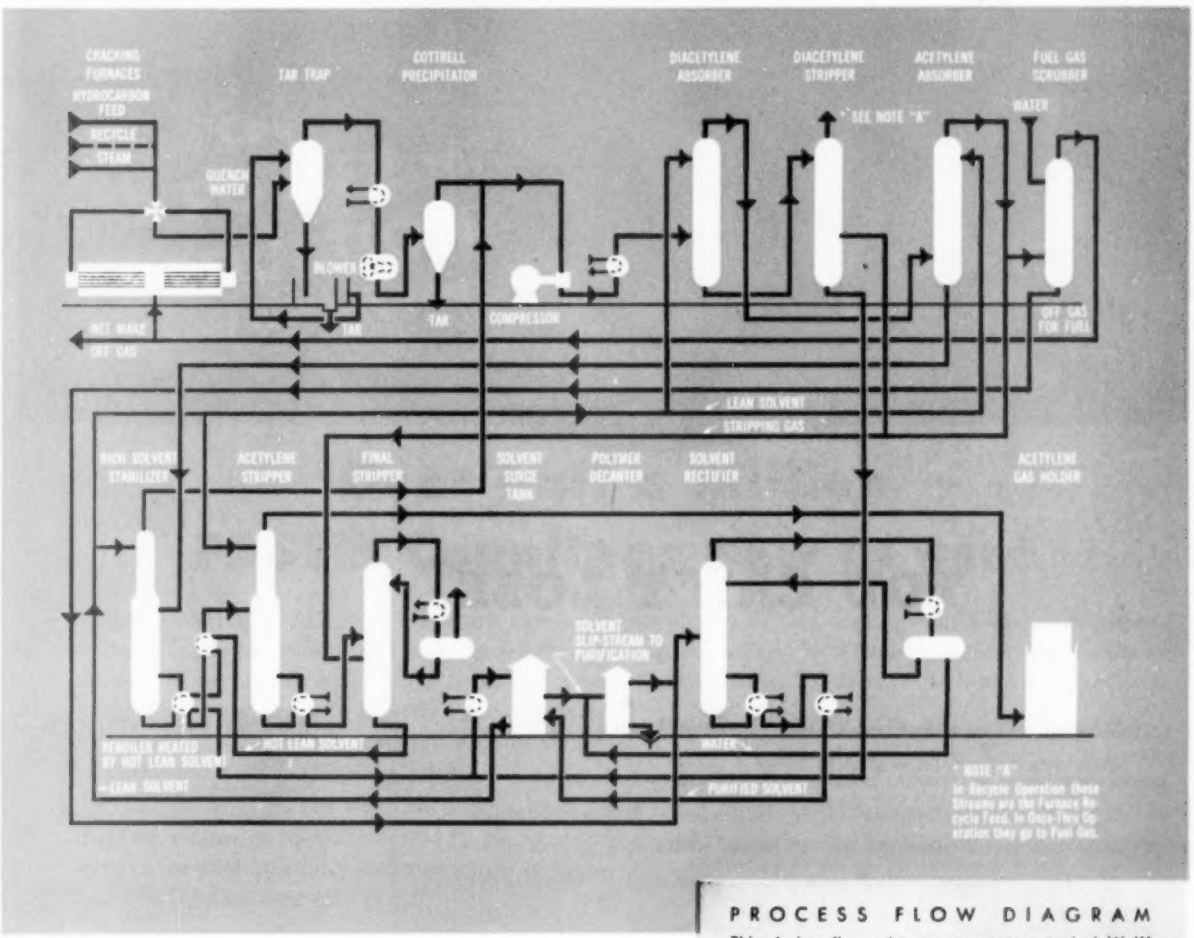
DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL 161

NOW—ACETYLENE
FROM HYDROCARBON FEED
via the Wulff Process

With heavy demands for the hundreds of petrochemical end products that may be synthesized from acetylene, the need for low-cost acetylene as a raw material is becoming urgent. The Wulff Process now answers this need with a high purity acetylene at the lowest cost ever offered by any process. Any petroleum hydrocarbon conveniently vaporizable can be used as a feed stock. Recent operations of the Wulff Process have proved it to be technically sound and commercially attractive. If your plant is convenient to a source of natural gas, ethane, propane, etc., it will pay you to investigate the possibilities of manufacturing acetylene economically by the Wulff Process.



The Wulff Process is available through Fluor, a name famous in process design, engineering and construction for the petroleum and chemical industries. For information on recent developments in this field, write for Bulletin EC-PA-0.002.

BE SURE WITH

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PROCESS FLOW DIAGRAM

This design flow scheme represents a typical Wulff Process plant for producing low-cost acetylene at 99+ volume percent purity from natural gas or propane. Two basic steps are involved: cracking of hydrocarbons to produce acetylene in a mixture of gases, and recovery and purification of the dilute product contained in the cracked mixture. Feed hydrocarbon is cracked in regenerative type furnaces heated by air-combustion of off-gas from the recovery section. No oxygen plant is required. The recovery and purification section is of conventional design operating at moderate temperatures and pressures. Only a single inexpensive readily-available solvent need be used. Operation is continuous and virtually automatic, requiring a minimum of operating personnel. Power demands are moderate, maintenance costs are low, hazards are negligible and there is practically no waste disposal problem.

Chemicals you live by

YOU CAN'T LOSE

When you bet on DIAMOND chromates and bichromates to help stop corrosion, everything is in your favor.

By using these DIAMOND Chemicals, the life of drill strings may be increased 5 to 7 times. At one producing well where careful records were kept, treatment with DIAMOND Chromates slashed operating costs from $550-$650 per month to $75-$150.

Many other DIAMOND Chemicals are at work saving money for the oil industry: carbon tetrachloride, bicarbonate of soda, caustic soda, chlorinated paraffins, chlorine, silicate of soda and several specialties.

You have everything to gain, nothing to lose, if you let your nearby DIAMOND representative give you the details. Isn't it worth a phone call?

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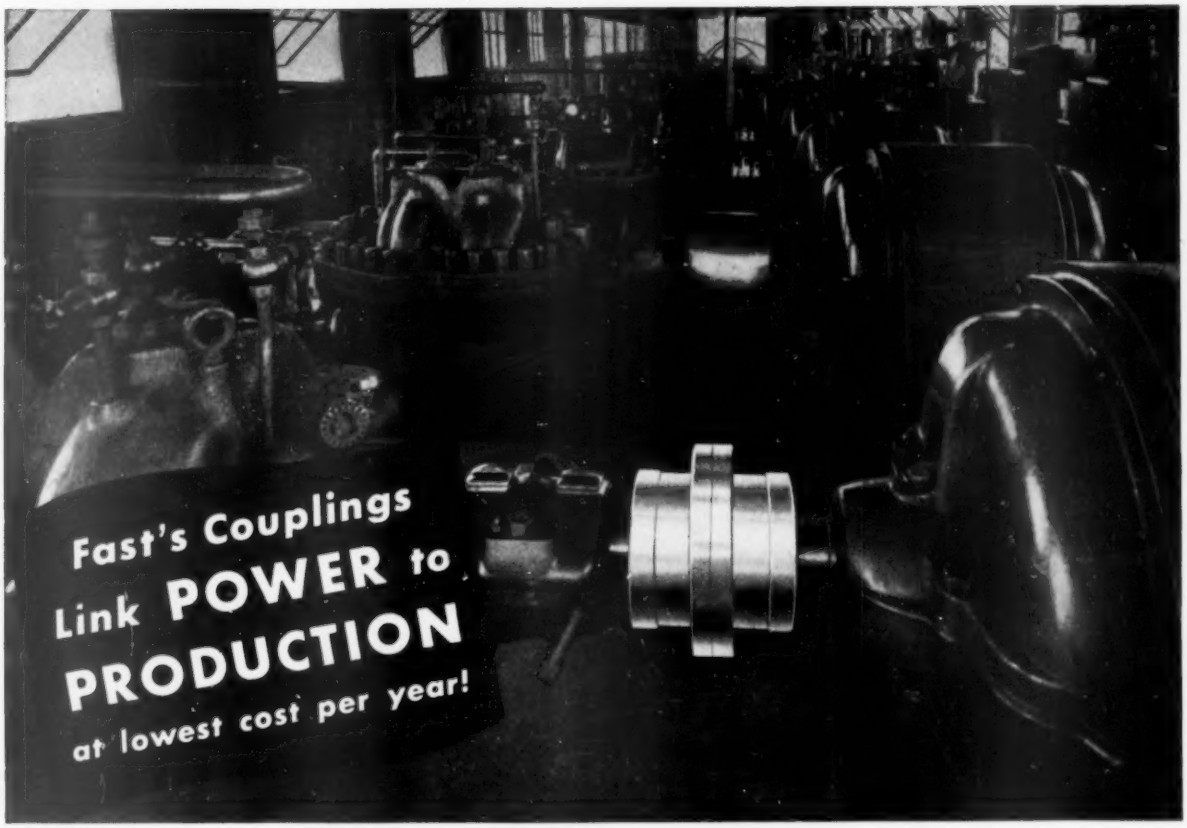
Diamond Chemicals for the Oil Industry

DIAMOND ALKALI CHEMICALS



Over half a million FAST'S Couplings now in use!

THROUGHOUT industry, Fast's are rated the most dependable couplings on the market... to the tune of over half a million now in service! Year in, year out, they continue to *outlast the equipment they connect* . . . save time, maintenance and money by eliminating costly coupling failures.

Actual cases on record show many Fast's Couplings have been in operation for 25 and 30 years without trouble. And every major producer of high-speed equipment now uses Fast's!

Solve your coupling worries! Write today for full details on Fast's Couplings and Koppers Engineering Service to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 287 Scott St., Baltimore 3, Maryland.

Here's How FAST'S Save You Money

Free Service—Koppers free engineering service assures you the right coupling for the job.

Rugged Construction—Fast's still maintains its original design, without basic change or sacrifice in size or materials. Result: freedom from expensive coupling failures.

Lowest Cost per Year—Fast's Couplings usually outlast equipment they connect. Their cost may be spread over many years!

KOPPERS

FAST'S
THE ORIGINAL
GEAR-TYPE
Couplings

INDUSTRY'S STANDARD FOR 32 YEARS

KOPPERS COMPANY, INC., *Fast's Coupling Dept.*
287 Scott St., Baltimore 3, Md.

Gentlemen: Send me Fast's Catalog which gives detailed descriptions, engineering drawings, capacity tables and photographs.

Name _____

Company _____

Address _____

City _____ *Zone* *State* _____

Lower your costs by switching to Stainless Steel Valves

There are many installations in the Oil Refining Industry where ordinary steel valves seem adequate — for awhile. But later on sour crudes or other corrosive fluids take their toll. Excessive maintenance and replacement begins.

When you install (or replace with) Powell Stainless Steel Valves, their much longer life and lower maintenance will repay, many times over, the slight differential in the cost of these valves.

The Wm. Powell Co.
Cincinnati 22, Ohio

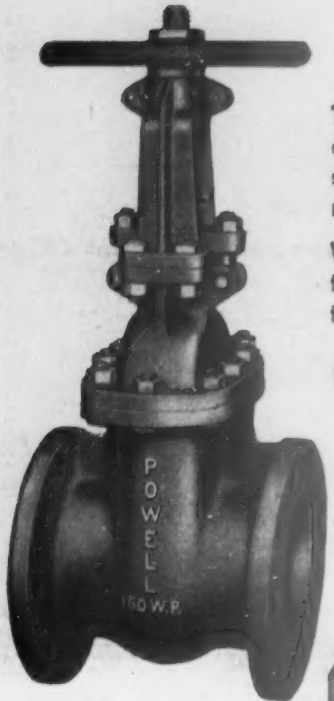
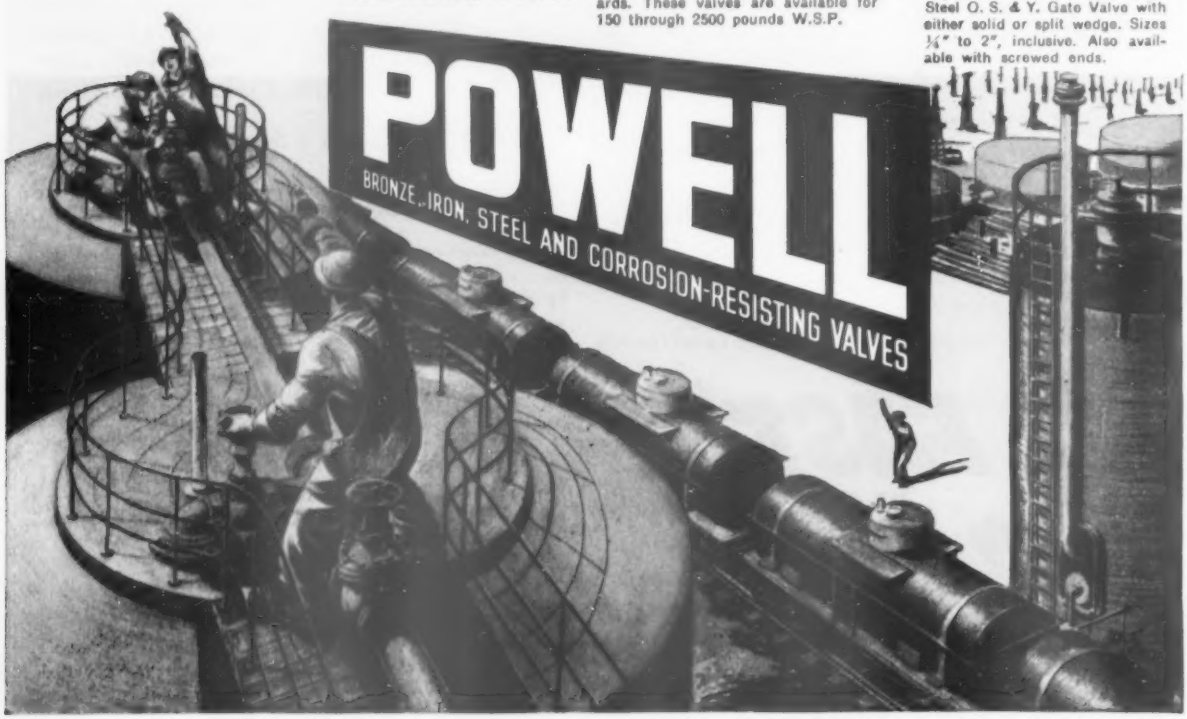


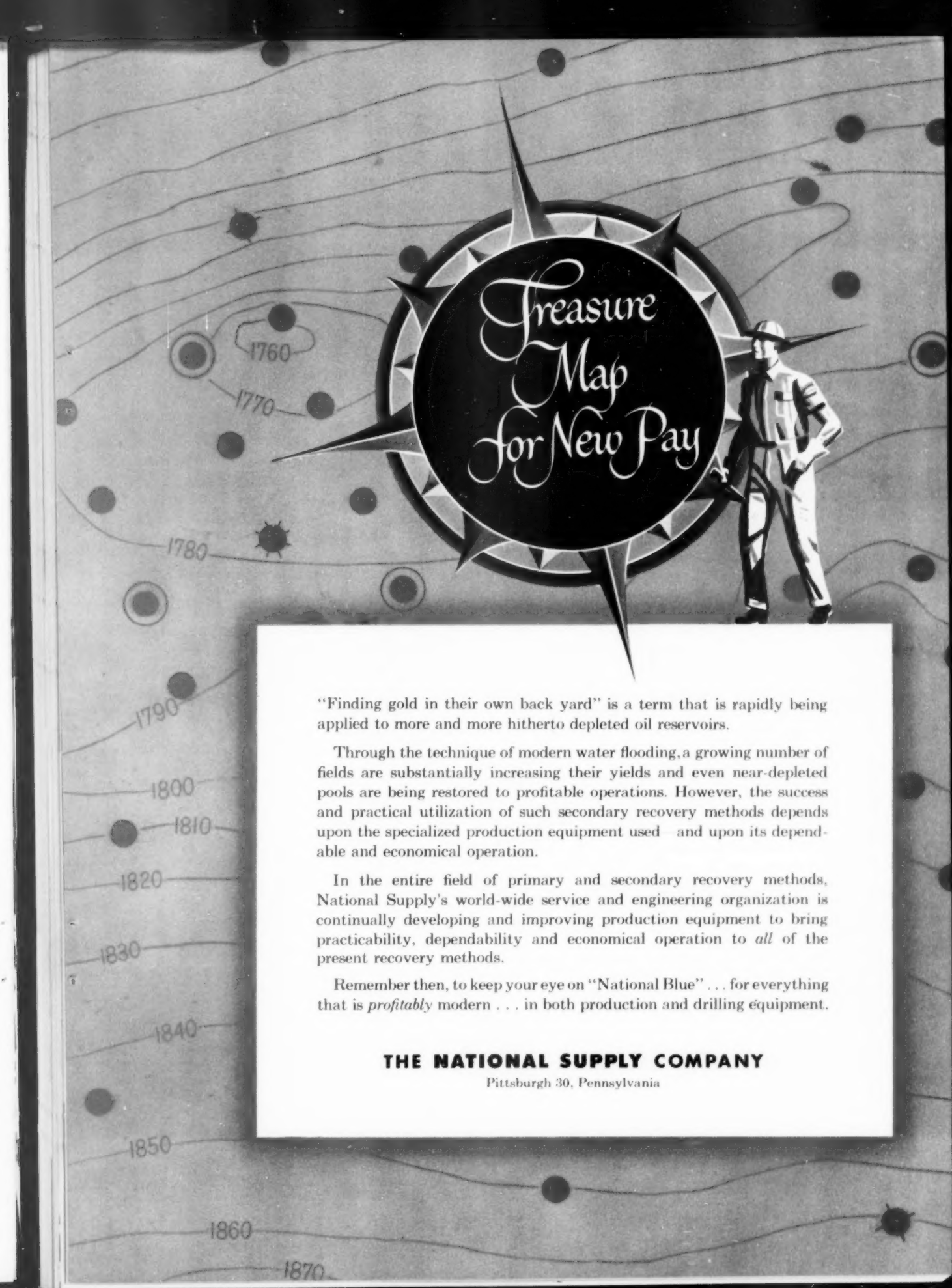
Fig. 2453-G — Large 150-pound Stainless Steel O. S. & Y. Gate Valve. Precision-fitted, accurately guided interchangeable solid or split wedge. Separable yoke arms in sizes 5" to 30", incl. Conforms to all the latest standards.

Fig. 1832—200-pound Stainless Steel Gate Valve with screwed-in bonnet. Sizes ⅛" to 2", incl.

Fig. 3061 S. S. — 300-pound Stainless Steel Swing Check Valve. Made from a heavy steel valve pattern, it conforms to A.S.A. and A.P.I. Steel Valve Standards. These valves are available for 150 through 2500 pounds W.S.P.

Fig. 2491 — 150-pound Stainless Steel O. S. & Y. Gate Valve with either solid or split wedge. Sizes ¼" to 2", inclusive. Also available with screwed ends.





"Finding gold in their own back yard" is a term that is rapidly being applied to more and more hitherto depleted oil reservoirs.

Through the technique of modern water flooding, a growing number of fields are substantially increasing their yields and even near-depleted pools are being restored to profitable operations. However, the success and practical utilization of such secondary recovery methods depends upon the specialized production equipment used — and upon its dependable and economical operation.

In the entire field of primary and secondary recovery methods, National Supply's world-wide service and engineering organization is continually developing and improving production equipment to bring practicability, dependability and economical operation to *all* of the present recovery methods.

Remember then, to keep your eye on "National Blue" . . . for everything that is *profitably* modern . . . in both production and drilling equipment.

THE NATIONAL SUPPLY COMPANY

Pittsburgh 30, Pennsylvania

for primary and secondary recovery

by any method!

choose from National's complete line of Production Equipment

National Supply's continual development of production equipment, over the decades of service to the petroleum industry, has resulted in one of the most complete lines of recovery equipment in the oil country.

As an example, National Pumping Units are manufactured in 38 standard combinations, with API walking beam ratings from 3200 lbs. to 32,400 lbs. Available also are special long stroke pumping units designed for higher volume pumping in secondary recovery operations.

As an example, National's exclusive Plunger Lift, which utilizes natural reservoir gas pressure for more efficiently producing weak flowing wells and for low cost pumping in wells where paraffin deposits, emulsion, bottom hole water and scale accumulation hampers rod-pumping efficiency.

As an example, National's new F-90 Triplex Pump, specifically designed for water-flooding operations—yet ideally suited for salt-water disposal, high-pressure testing, gathering, formation fracturing, acidizing . . . or as power-oil source for subsurface hydraulic pumping systems.

As an example, National's top quality Sucker Rods, manufactured in three grades to meet all pumping conditions . . . and produced under the most exacting metallurgical and manufacturing standards in the industry.

Whatever methods of recovery operations you employ, be sure to get all of the profitable facts on the complete National Blue Line of production equipment. Product bulletins are available on request at your nearest National Supply Store.

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

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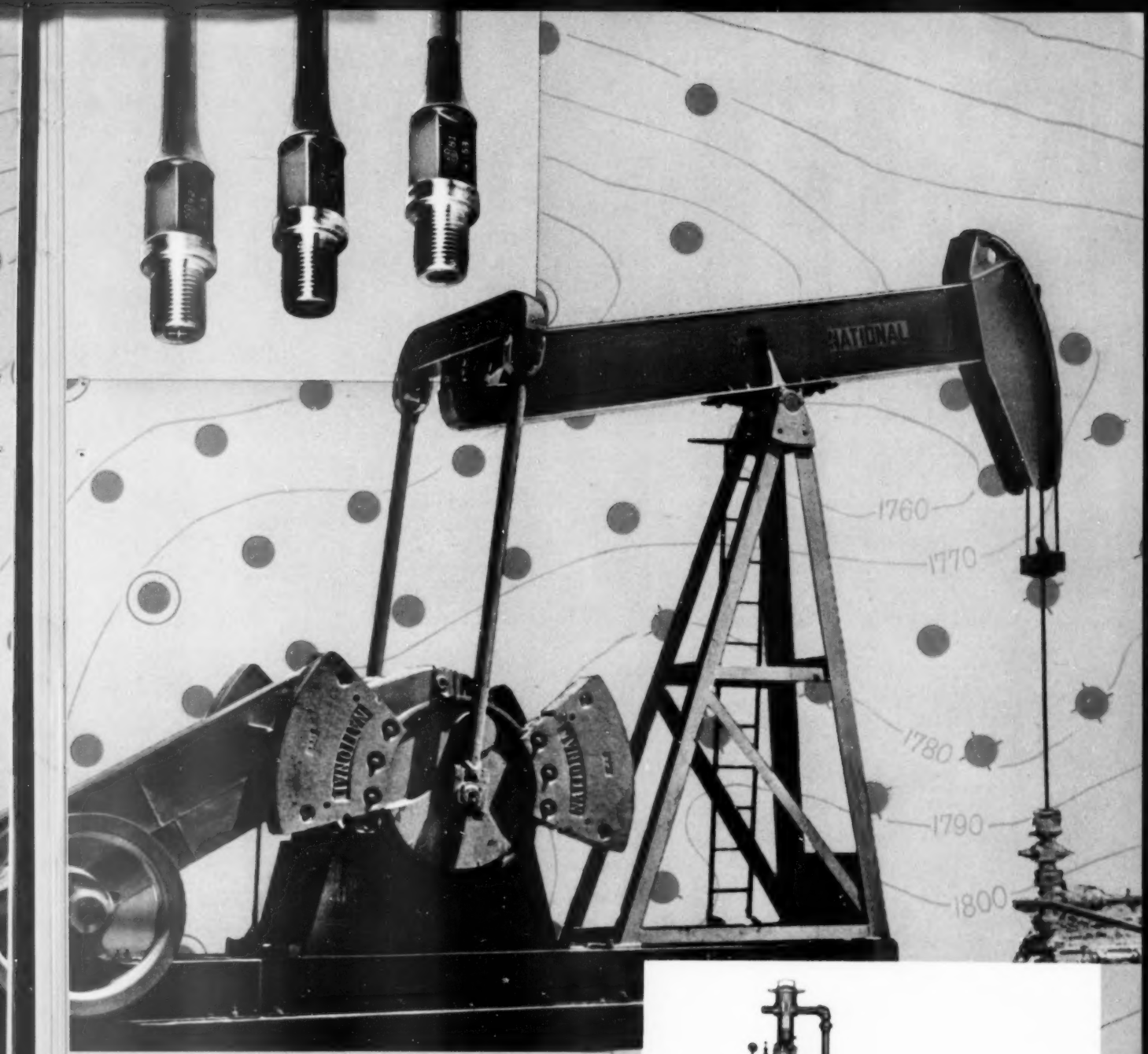
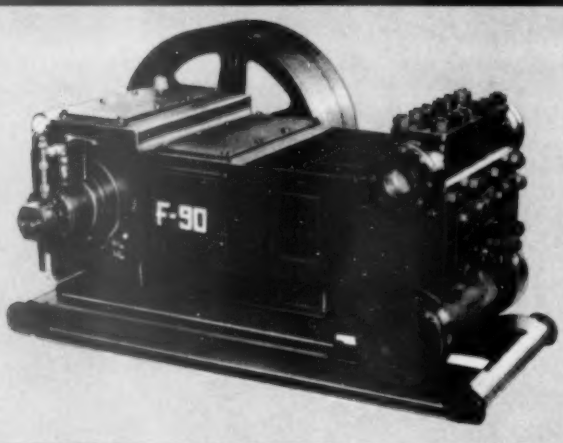
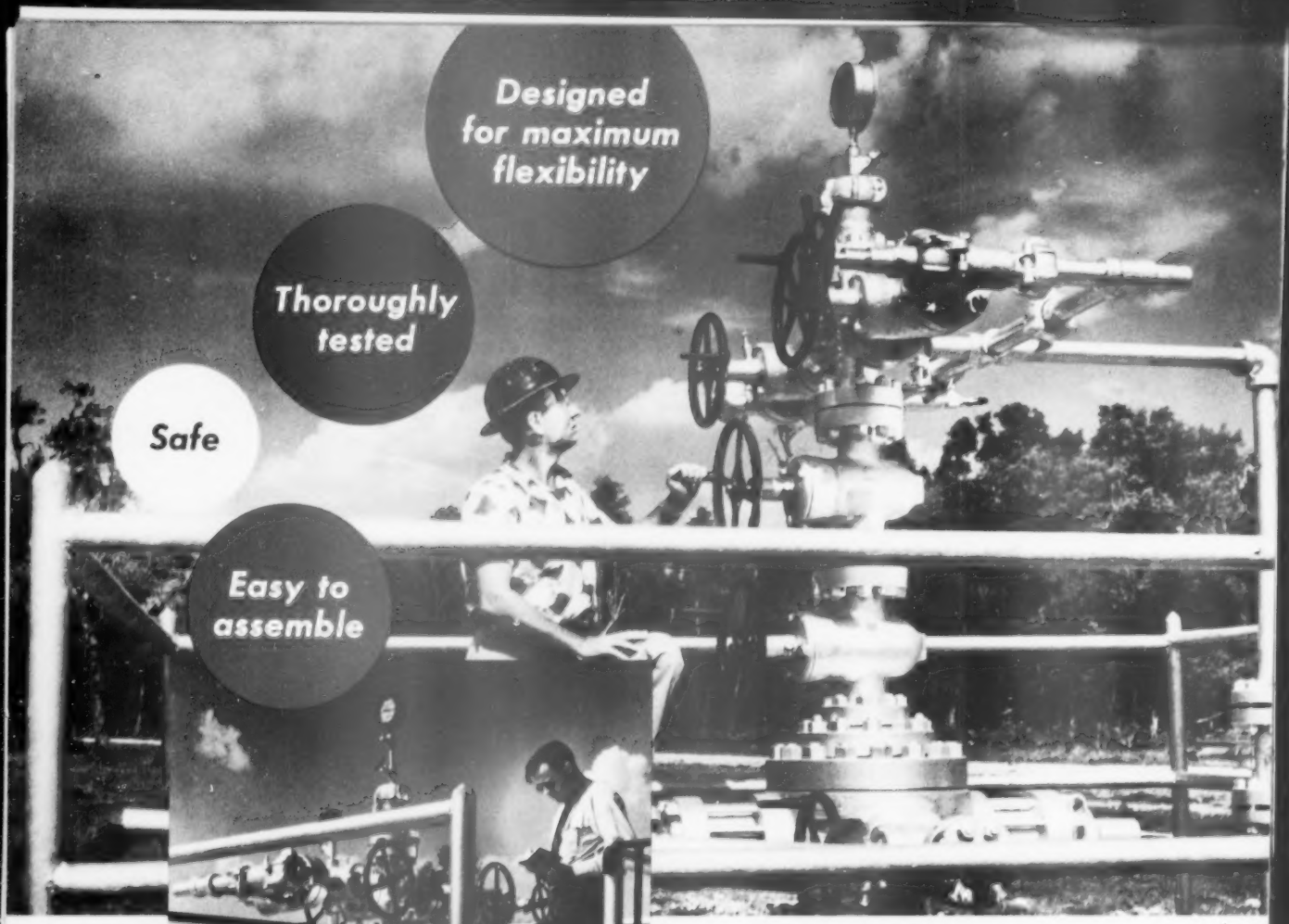
NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT





SPANG STEEL PIPE • • SUPERIOR & ATLAS ENGINES



NATIONAL

WELLHEAD EQUIPMENT

For practically any completion method at any depth or working pressure, National Wellhead Equipment is available in a wide range of sizes and types. Each tree in the National Line is built to give you the utmost in dependable, efficient performance.

Engineered, manufactured and completely tested at National Supply's Houston, Texas, plant, National Wellhead Equipment is readily available in the stocks of National Supply Stores throughout the United States and Canada to meet all of your requirements. Get a copy of National's new product bulletin on Type B Pressure Pack Wellhead equipment from your National equipment specialist today, or write direct.

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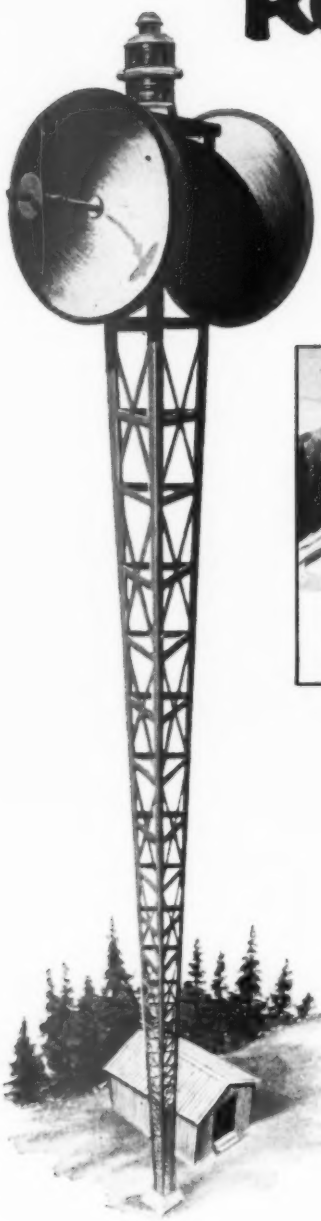
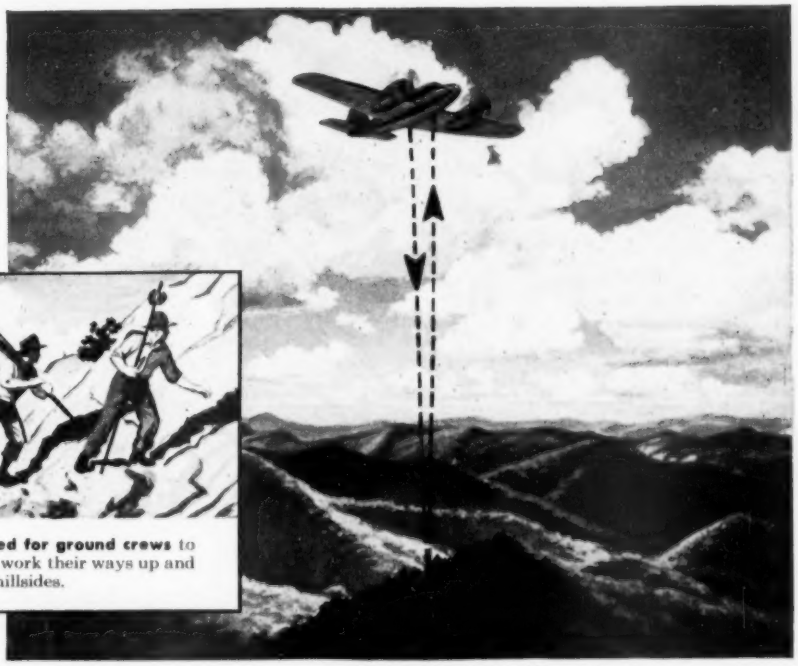
National Oil Field Machinery and Equipment • Spang Steel Pipe • Superior & Atlas Engines

NATIONAL BLUE PRODUCTS

RCA MICROWAVE





No need for ground crews to slowly work their ways up and down hillsides.

Radar signals provide precise data on contour of earth beneath proposed path of a microwave beam.

RCA AERIAL SURVEY
speeds installation ... insures accuracy

For the ultimate in microwave planning, RCA offers the important advantages of fast, accurate aerial survey.

Flying a simulated path of the microwave beam, ground elevations are charted by continuous readings from a vertical radar system. Recording instrumentation enables the survey team to plot an accurate route—and an *alternate route*—at high speed. By direct observation and aerial photography these experts select the most economical, easily accessible sites. An unobstructed microwave route is plotted in a fraction of the time normally required—without the premature publicity that often results from surveyors' operations.

For dependable communication, proved on existing systems, call an RCA Microwave Specialist at the nearest Regional Office, or MAIL COUPON.

• • •

Check RCA 2-way radio for proved dependability in mobile communications.

And remember, only RCA can provide the nationwide service facilities of the RCA Service Company.

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COMMUNICATIONS DIVISION **CAMDEN, N. J.**

Communications Division
Radio Corporation of America
Dept. 89S, Building 15-1
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Please send me your free booklet on:

- ☐ RCA Microwave
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City_____ Zone____ State_____

A 50-yard dash with a potato on a spoon! An exciting bit of Americana—but it's not the

World's Greatest Potato Race

That's the 2200-mile dash on the Santa Fe with 1,350,000,000 potatoes

Somebody east said, "Pass the potatoes!"

Out in California, the fertile San Joaquin Valley heard them. And look what happened.

Santa Fe started moving 14,000 to 15,000 carloads of potatoes to hungry markets all over the Midwest and East. 36,000 to 40,000 pounds to a carload. As high as 550 carloads per day at peak of harvest. That's more than 1,350,000,000 potatoes. And that's a lot of spuds.

Bag 'em. Load 'em. Roll 'em. And hustle. Somebody east said, "Pass the potatoes!"

MARKETS ARE PERISHABLE, TOO

From America's largest fleet of refrigerator cars owned by an individual railroad, these yellow Santa Fe "reefers" are dispatched to the "Potato Capital of the West."

There the cars are cleaned . . . checked . . . loaded . . . switched. And iced fast (a car a minute, if you please). These potatoes can't wait!

In servicing the cars as they speed east, new icing docks at Bakersfield and Needles, Calif., Belen, N. Mex., Waynoke, Okla., and Kansas City work the clock around. Electronically-controlled "hump" yards speed the switching.

SANTA FE PRECISION—SANTA FE SPEED

On-time delivery calls for full-time precision to keep these schedules "on the advertised."

After the potatoes come the wheat . . . citrus fruits . . . grapes . . . melons . . . and green vegetables all year long—flooding east from Santa Fe country to you. Everything from avocados to zucchini.

It costs Santa Fe millions of dollars to serve you so—and provide you with Super Chiefs, too! But we're proud to say they are earned dollars. Not one penny comes from the taxes you pay.

SANTA FE SYSTEM LINES

Santa Fe

PROGRESS THAT PAYS ITS OWN WAY

Welex

DEPENDS ON DU PONT JET PERFORATORS FOR POSITIVE PERFORATIONS

Positive perforations and deep penetration into pay zones are prize objectives on every job handled by Welex Jet Services, Inc., Ft. Worth, Texas. To insure the best possible results, this experienced organization has long depended on Du Pont Jet Perforators.

These powerful Jets are the most effective tools yet designed for perforating oil-well casing without the risk of casing rupture. They readily pierce one, two, even three strings of casings . . . penetrate deep into the formation and well beyond the range of mud damage. If there's oil in the area . . . Du Pont Jets will bring it in.

Furthermore, Du Pont Jet Perforators leave practically no burr in the casing so that packers and other tools can be lowered through the perforated zone without scraping. Nor do deep wells present any problem since these perforators function with maximum efficiency at bottom hole temperatures above 300°F.

On your next oil-well perforating job . . . be sure to specify that the service crew use Du Pont Jet Perforators. You'll find—just as so many operators have—that these Jets help insure positive perforations . . . deep penetration . . . increased productivity . . . maximum over-all economy. They're widely used by major oil-well service organizations. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT EXPLOSIVES

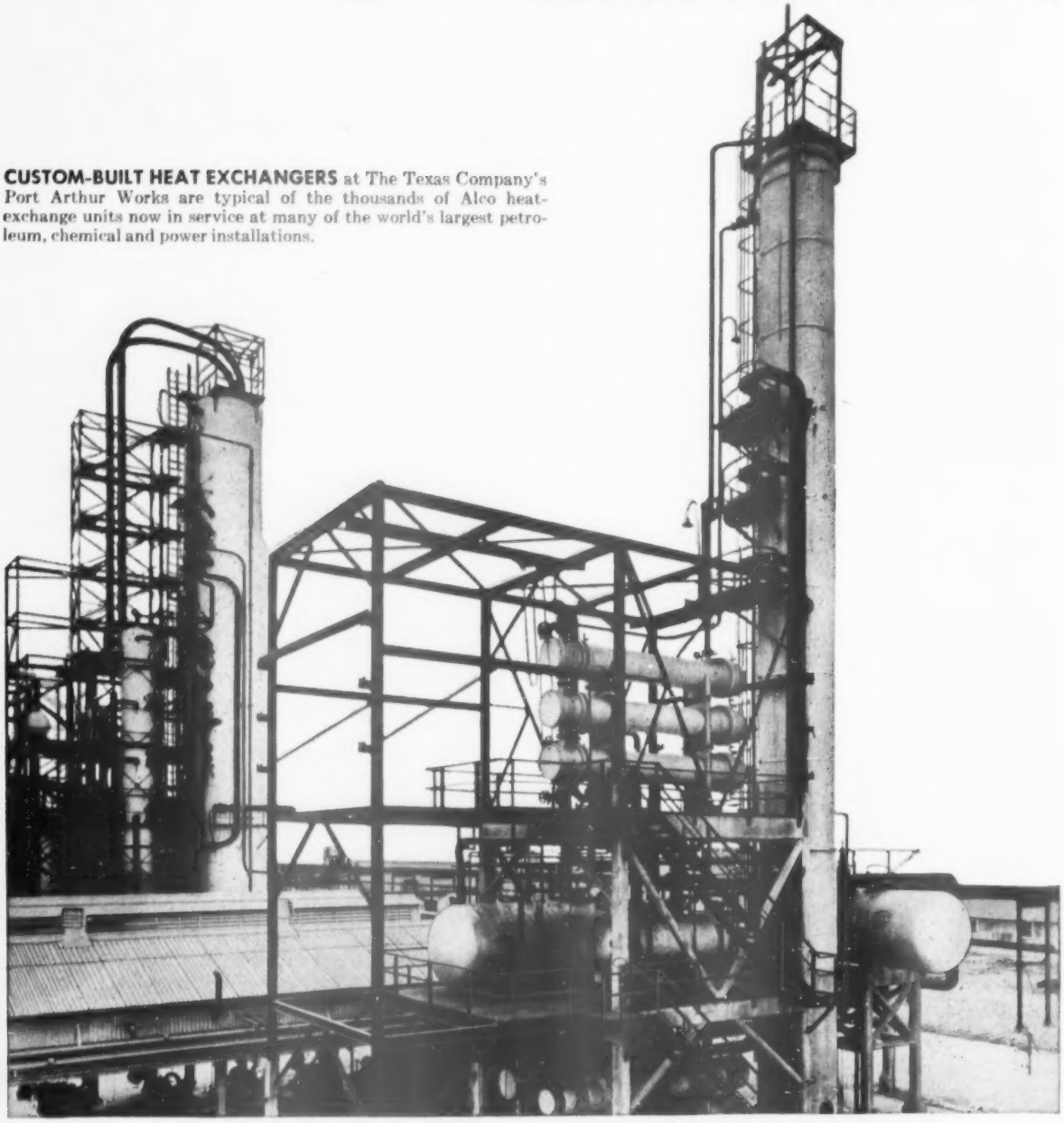
Blasting Supplies and Accessories

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

demanded by growth and

Answers to



CUSTOM-BUILT HEAT EXCHANGERS at The Texas Company's Port Arthur Works are typical of the thousands of Alco heat-exchange units now in service at many of the world's largest petroleum, chemical and power installations.

Hundreds of new industrial problems call for new and varied types of heavy metal equipment. More and more frequently, the answers are designed and built by Alco.

Alco's experience in the heavy equipment field is unsurpassed. You will find Alco products today in power, petroleum, chemical and manufacturing plants all over the world.

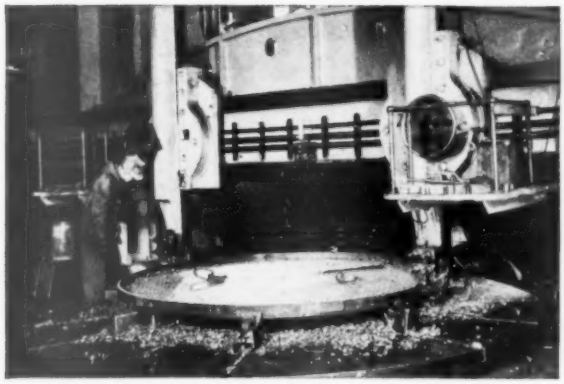
Alco's production and testing facilities are modern and complete. At the 31-acre Alco plant at Dunkirk, N. Y., the most difficult of metal-fabricating operations are handled with maximum speed and efficiency.

If your own industrial problems call for the kind of heavy metal equipment you see on these pages—the kind that can meet your strictest specifications—send the details to your nearest Alco Products Sales Engineer.

You will find him at New York, Chicago, Los Angeles, Kansas City, Houston, Tulsa or Beaumont. Or write direct to Dunkirk.

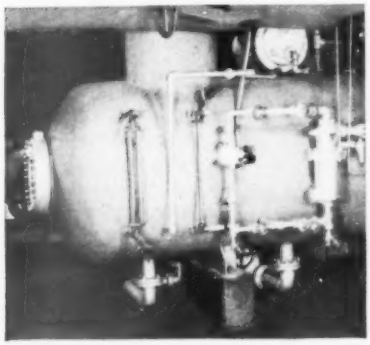
progress...designed and built by Alco

New Industrial Problems



LARGE DIAMETER BORING MILL at Alco's recently expanded Dunkirk plant is equipped with heads for both straight and bevel work. This is one of the many special machines that enable Alco to produce efficient, economical answers to hundreds of new industrial problems.

21 ALCO AIRCOOLERS handle all water cooling requirements at each of four pumping stations on the Trans-Arabian Pipe Line—with ambient temperatures as high as 122 F! Available in either radiator-core or fin-tube types, Alco Aircoolers offer a means to lower cooling costs for scores of applications.



FLEX-TUBE EVAPORATOR at New York State Electric and Gas Corporation's Hickling Station was designed and built by Alco to produce vapor under controlled conditions, of not more than 0.5 parts of total solids. Patented Flex-Tube construction greatly facilitates removal of scale.

25,000 FT OF ALCO STEEL PIPE help furnish the Arnold Engineering Development Center of the USAF with 100,000 gallons of cooling water per minute. Over the years, Alco has produced pipe of all shapes, sizes and materials for many of the largest industrial and municipal piping installations.

125-TON REGENERATORS for El Paso Natural Gas Company's new gas-turbine pumping installation are 10 ft in diameter, 33 ft long and contain over 5000 tubes. Units like these illustrate the wide range of special heavy-metal equipment designed and fabricated by Alco to meet virtually any specifications.

ALCO

ALCO PRODUCTS DIVISION

AMERICAN LOCOMOTIVE COMPANY • DUNKIRK, NEW YORK

NICHOLSON W. O. TRAPS

Cannot Leak Live Steam

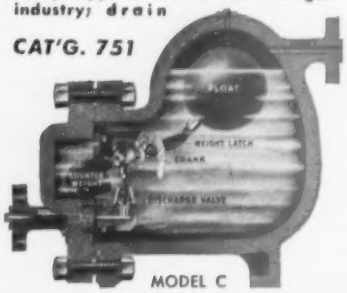
Even though re-evaporation completely dries up its body, a Nicholson weight-operated trap will not leak live steam. Widely used for steam purifiers, super-heated steam lines, headers, separators, heaters, etc.

DRAIN GASOLINE, WATER, OIL

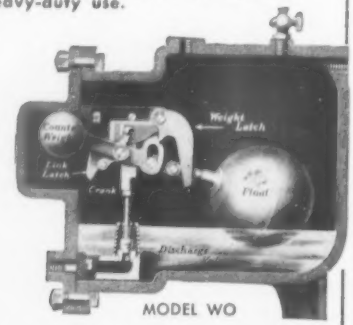
Nicholson W. O. traps also have many applications in natural gas industry; drain gasoline from scrubber head of booster and gas lift compressors; gasoline, oil or moisture from gas well separators, accumulators, after-absorbers, etc.; package natural gasoline plants; gas lines.

4 TYPES—press. to 200, 500, 650, 1500 lbs.; for every large-capacity, heavy-duty use.

CAT'G. 751



MODEL C



MODEL WO

210 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

EXCEL-SO Combination

SEPARATOR – FILTER – AIR ELIMINATOR

. . . for removal of bulk quantities of water, pipe scale, and rouge from products Pipelines . . . . .

These HPQ-1000 SC Separators are in use at Plantation Pipe Line Company's Baton Rouge Pumping Station. Today, more and more Products Pipe Line Companies are using EXCEL-SO Units to remove water and dirt from products streams either as primary coalescers or as first-stage units in connection with desiccant dehydration.

Write for Bulletin FEQ-51

WARNER LEWIS COMPANY

BOX 3096 • TULSA, OKLAHOMA

They Say—

Proposes New Agency

"Acting on the assumption that the Congress will continue in limited form vital provisions of the Defense Production Act after June 30 . . . the Commerce Department has completed preparations to set up a streamlined organization which we can describe as a business service agency.

"We propose . . . to establish approximately 20 main industry divisions with key advisors, and staffed for operation purposes by industrial experts from the career service.

"The new unit will be coordinated with regular agencies of the department so that not only will government have access to top level business counsel, but each segment of industry will have its own special division for receiving government information and service.

"The functions of the proposed business services agency will be to: continue production directives and allocations of materials for defense and atomic energy; service respective industries with specific information; secure cooperation of all industries in a mobilization base and post-attack program; keep up to date industry organization plans for crisis; act as authoritative voice of industry so that the executive branch and Congress may hear the opinions of business and receive helpful information; effectively approve or disapprove of the implementation of such policy and plans from the standpoint of their practical workability in everyday industrial operation."

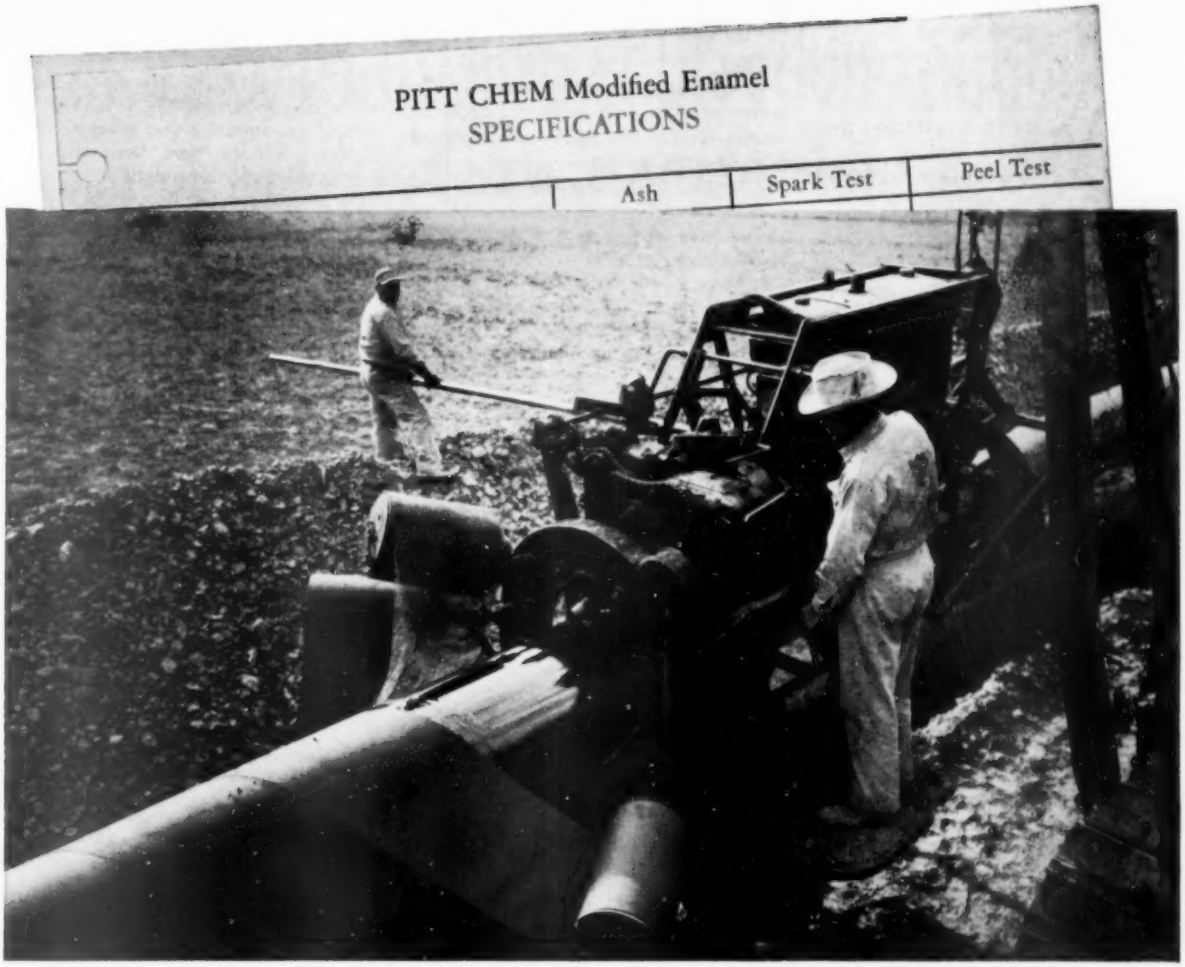
Sinclair Weeks, Secretary of Commerce, in an address to the annual convention of National Sales Executives, Inc., Atlantic City.

Oil Means Better Living

"The more oil a people use, the better they live.

"Take the countries in which the common man uses the most oil; they are the countries in which he has the most to eat and wear, earns the most goods in the fewest hours of work, hears the most music, sees the most shows, and goes farthest on his vacations. If cleanliness is akin to godliness, they are also the most righteous; they are the countries in which people use the most soap.

"Oil consumption per person and standard of living go hand in hand. We needn't argue about which is the



A better coating job because the Enamel is backed by rigid *Specifications!*

PITT CHEM Modified Enamel will give you a better coating job every time because every drum meets the same rigid specifications as the last. These specifications are available on request—written proof that Pitt Chem Modified Enamel will perform better on application and in use.

And because each drum of Pitt Chem remains uniform within these specifications, you'll find that this tough, durable enamel will heat up faster . . . flow better from kettle to pipe . . . coat more pipe per day, and stand up to a wide range of temperature conditions. It all adds up to better performance on application and assured protection underground . . . because Pitt Chem Modified Enamel is *quality-insured* by specification. ● *More product information, technical data or specification sheets are yours for the asking.*

WBD 4428

- ★ Standard Grade Tar Base Enamel
- ★ Modified Grade Tar Base Enamel
- ★ Plasticized Grade Tar Base Enamel
- ★ Cold Applied Tar Base Coatings

PROTECTIVE COATINGS DIVISION

PITTSBURGH COKE & CHEMICAL CO.

Grant Building · Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

chicken, which the egg. The significant thing is that the two go together.

"Pick at random four or five countries over the free world. Compare oil consumption per person and national income per person. You will find that the two keep step."

Max W. Ball, Washington, D. C., oil and gas consultant, in an address before the Geological Society of Turkey, Ankara.

Import Restrictions Not Needed

"Bills have been introduced into Congress which would, among other things, put quota limits on the amount of oil which could be imported into the United States in any year.

"Two principal groups—the coal industry and the Independent Petroleum Association of America—have pressed for adoption of these restrictive proposals. The coal companies claim that imports of heavy fuel oil take business away from them to an extent that results in stagnation of their industry and unemployment in the mines. The I.P.A.A. claims that imports of crude oil and of heavy fuel oil are unduly restricting the output of domestic crude oil and are slowing down oil exploration efforts in this country.

"We believe that these claims are not consistent with facts. The development of the railroad diesel engine and of the natural gas industry and other technological advances have been the real factors which have brought about a decline in coal production. . . . As for the domestic oil industry, it had the largest production in its history in 1952, and indications are that production this year will be even higher. And the exploration effort by the domestic industry continues at a high rate."

Eugene Holman, president of Standard Oil Co. (N.J.), addressing the annual stockholders meeting, Linden, N. J.

Afraid of Peace

"The prophets of doom are at work amongst us predicting that a depression, or at least a severe recession, is certain to develop as the result of the termination of war contracts.

"In fact, there are some men walking about today who talk of peace as if it were terrible. This kind of talk is not only nonsensical, but it is also highly dangerous. It serves to undermine public confidence in our economic system at a time when nation-wide faith in it must play a big role in carrying us safely through whatever problems may arise in the future."

H. W. Christensen, president of the National Association of Purchasing Agents, speaking at the annual convention of the group in Los Angeles.

Keener Competition Ahead

"The United States has increased its oil and gas consumption at a rate of 10 per cent a year since the war, to the point where it now consumes twice as much each year as it did in 1940. Demand in the next 7 years in contrast, is expected to grow only a third as fast as this phenomenal postwar increase.

"The oil industry has expanded rapidly to take care of today's needs—and it is continuing to expand. And this means that competition for new business is going to be keener as the yearly increases in demand becomes smaller."

From an article in the Shell News.

Government Needs Aid

"As a businessman in government, I am shocked to find some businessmen ignoring the financial menace hanging over this government. If any one class should understand from experience and logic the perils of inflation and unchecked debt, it is the business com-

"What safety tool do I use?
"Give me Berylco tools every time. I'll tell you why. In order to make some of the other tools as strong as beryllium copper, they make 'em twice as big. No matter how good a mechanic you are, you feel as though you had ten thumbs."

Berylco safety tools are made of high-performance beryllium copper. That means that they are not only nonsparking, noncorrosive and nonmagnetic, but much stronger than tools made of other safety materials.

In addition to their added safety factor, Berylco tools compare favorably with the quality you expect in steel tools. They're hard and tough. They retain their cutting edges, and they last a long time.

Berylco Safety Tools are widely distributed through jobbers. Write for the name of the one nearest you — and for a complete, illustrated catalog.

BERYLCO THE BERYLLIUM CORPORATION

Dept. 3-G • READING 15, PENNA.

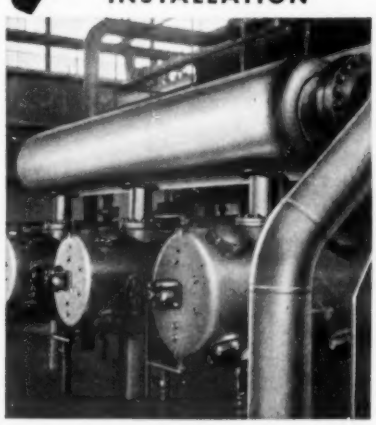
BURGESS-MANNING Pulsation Snubbers

included in NEW PLANT DESIGNS
by many leading

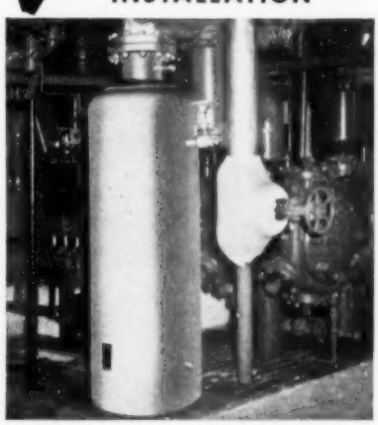
PROCESSING
ENGINEERING
and CONTRACTING COMPANIES

✓ TYPICAL OIL-REFINERY INSTALLATION

✓ TYPICAL GAS PIPE-LINE INSTALLATION



✓ TYPICAL CHEMICAL-PLANT INSTALLATION



Burgess-Manning experience and "know-how" in the control of surge in gas and air piping can be of valuable service to all processing, engineering, and contracting companies faced with designing piping systems without pulsation problems.

Pulsation snubbing has proven its effectiveness in best efficiency, process action, gas transmission, and gas metering.

To help you overcome pulsation and vibration in gas and air lines excited by compressors, reciprocating pumps, or blowers, Burgess-Manning Company's specialized engineering group is available to study and analyze flow conditions. Recommendations and designs for each project will be developed as required. Supplemental field surveys can be made where existing operations are involved.

If you are confronted with the problem of reducing pulsation in gas pipe lines, consult with Burgess-Manning. Recommendations for your piping projects will be developed at your request.

BURGESS-MANNING COMPANY

SOUND ENGINEERING

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DALLAS, TEXAS

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WECO...the UNIONS you can trust for Sealing and Service

Selected Raw Materials

Advanced Manufacturing Practices

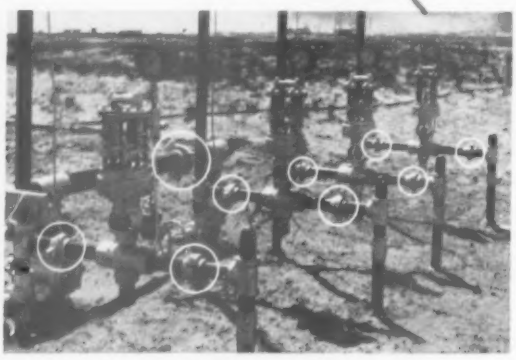
Ball and Cone Seat

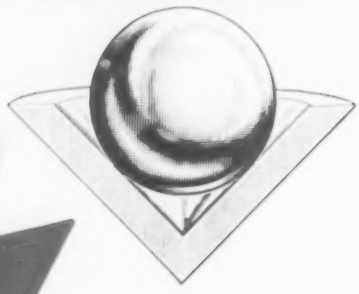
Rugged Acme Threads

Heavier Wall Sections

Precision Seating Surfaces

• Fig. 400 WECO Unions on a high pressure manifold.





Ball and Cone Seat

• WECO Unions have always been famous for their positive, easy seal . . . a seal that holds under severest operating and service conditions.

This quality in WECO Unions is the result of precision machining of the Ball and Cone Seat, wherein the spherical surface on the male sub seats on the conical surface of the female sub. The true line of contact between these two metal surfaces produces a seal that holds against high pressures, shock, surge and vibration . . . that is practically impervious to damage.

Every union in the WECO line has this proven sealing arrangement. It is assurance that, regardless of your service requirements, the size or pressure union needed, you can depend on WECO Unions to seat properly and seal perfectly, everytime.

PESA

SOLD EXCLUSIVELY THROUGH SUPPLY STORES.

It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
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CHIKSAN EXPORT COMPANY, Brea, Calif. • Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

munity. Yet some of this group seem blind to realities.

"If in an era of prosperity, a pro-business administration, staffed in high places by former businessmen, is not given the power to stop deficit financing, what hope can there ever be of getting this government on a solid financial foundation?

"If businessmen don't back up wise financing and if, as a result of their walk-out, the sound money program fails, then, in the consequent inflation and mounting debts, businessmen themselves will suffer severely."

Sinclair Weeks, Secretary of Commerce, in an address to the Harvard Graduate School of Business Administration, Cambridge, Mass.

Need for Personality

"The management of Cities Service Oil Co. is interested in men and women who can get along with people.

"It is interested in men and women who handle their human contacts with courtesy, cheerfulness, tact, and understanding.

"That ability will not, by itself, enable an individual to fill a job.

"It won't cure, or compensate for, laziness, or ignorance, or stupidity.

"But it will help increase production, win good will, and make sales. It will help avert misunderstandings, reduce labor turnover, and prevent costly accidents.

"And it will help create the kind of 'company personality' that is one of the ingredients necessary to a successful operation.

"For a company does have a personality, just as an individual.

"It is a reflection on the combined personalities of all the men and women who make up the company family. It is a reflection of their attitudes toward their jobs and toward each other."

S. B. Irelan, president, in Cities Service Oil Co.'s magazine Empire.

CALENDAR OF EVENTS

JULY

July 30-Aug. 1 Wyoming Geological Association, eighth annual field conference, University of Wyoming, Laramie.

AUGUST

17-19 Society of Automotive Engineers, international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

18-21 American Institute of Electrical Engineers, Vancouver Hotel, Vancouver, B. C.

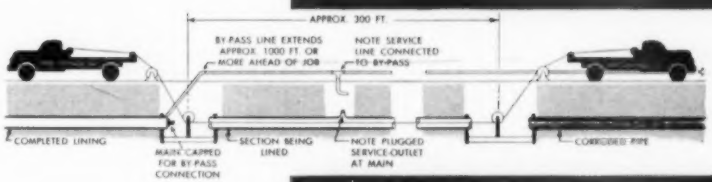
24-26 Appalachian Gas Measurement Short

have you seen an Eskimo pipe?

Practically the only materials available to the early Eskimo for his pipe were bone, ivory and small twigs. The most primitive type of pipe was made by splitting a straight willow wand, removing the pith and hollowing out one end for the bowl, then binding the two hollowed out pieces to form the long stem. Mighty tough smoking for the Eskimo who couldn't enjoy the straight, clean and easy-drawing pipes made today!

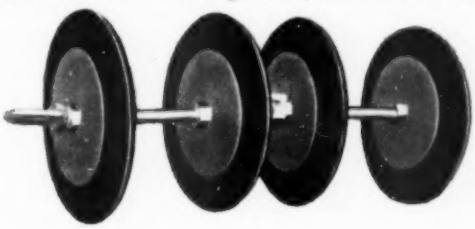
have you seen a modern pipe lining operation?

The Tate Process, applicable to water, oil and gas pipe lines, renews old iron and steel pipe "in place" as shown here in the schematic drawing. The Tate Process is applicable to pipe lines from 4" to 16" in diameter. Only momentary interruption to service is necessary while by-pass sections are installed.


APPROX. 300 FT.
BY-PASS LINE EXTENDS APPROX. 1000 FT. OR MORE AHEAD OF JOB
NOTE SERVICE LINE CONNECTED TO BY-PASS
COMPLETED LINING
MAIN CAPPED FOR BY-PASS CONNECTION
SECTION BEING LINED
NOTE PLUGGED SERVICE-OUTLET AT MAIN
CORRODED PIPE

have you seen the *Steel Scraper?* . . . It is pulled through pipe, dislodges all incrustation, corrosion and tubercles, makes inside clean and smooth.

have you seen the *Rubber Swabber?* . . . It follows the scraper and pulls out loosened material leaving pipe clear and free of debris.



have you seen the *Tate Process liner?*...It completes the renewing process by squeezing cement mortar onto the inside of the pipe wall, making the surface smooth and water-proof. Liquids move swiftly without drag.

If your worn-out pipe looks like this! **The Tate Process renews it like this!**

YOU GET THESE ADVANTAGES FROM CEMENT MORTAR LINING!

- New pipe performance
- Prevents leakage
- Restores full flow coefficients
- Reduces pumping and maintenance costs
- Protects against corrosion, contamination and discoloration at much less than the cost of installing new pipe!

Pipe Linings, Inc. offers *"In place"* Tate Process lining service for pipe 4" to 16" in diameter and *"In place"* Centriline Process lining service for pipe 16" to 144". Complete mobile equipment and expert crews are available to bring new efficiency to your old pipe. A Pipe Linings, Inc. hydraulic engineer will be glad to discuss your problem. No obligation! Send the coupon today!

PIPE LININGS, Inc.

4675 Firestone Blvd., South Gate, California

PIPE LININGS, Inc., 4675 Firestone Blvd., South Gate, Calif.

( ) Please send complete information on how to obtain new pipe line performance from my old pipe.

( ) Please have one of your hydraulic engineers call on me.

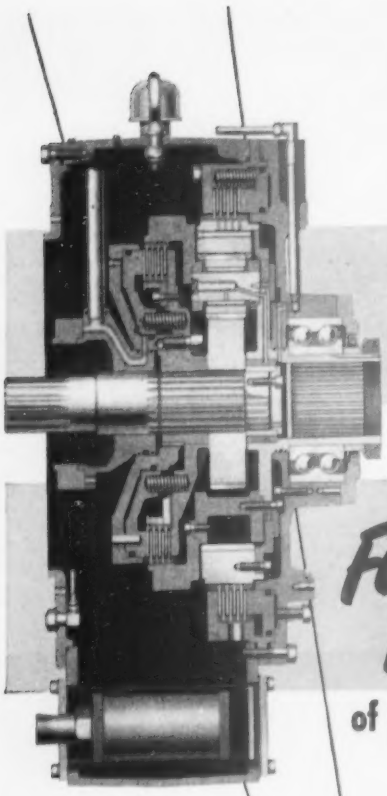
Name_____

Title_____

Company_____

Address_____

City_____ State_____



NEW

2-SPEED TRANSMISSION

extends

Full-Range Performance

of your Torque Converters

Engineered specifically for use behind three-stage torque converters, the new Twin Disc 2-Speed Transmission—Model T-302—permits converters to deliver extended performance within their *maximum* operating range.

New Model T-302 is completely *oil-actuated*, for smoother, more positive action—designed around a planetary system with lockup feature for *direct drive*. Installed on your 3-stage torque converter, it provides three operating positions: Neutral, Low, and High. Ratio spread is available in 2.69:1 or 3.07:1. Entire unit is self-lubricated.

To gain the advantages of extended performance from 3-stage torque converters on *your* equipment, get this newest development in transmissions. For full details on the new Model T-302 2-Speed Transmission, contact your nearest Twin Disc Factory Branch or Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois.

New Twin Disc 2-Speed Transmission, Model T-302, designed to give 3-stage torque converters extended performance within maximum operating range. Engineered for easy installation.

Built for a Long Life . . .
Backed for a Lifetime

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
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Course, West Virginia University, Morgantown, W. Va.

Aug. 31-Sept. 1 Interstate Oil Compact Commission, Northern Hotel, Billings, Mont.

SEPTEMBER

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago.

9-11 Pacific Coast Gas Association, San Francisco.

11-12 Association of Desk and Derrick Clubs of North America, annual meeting, Cosmopolitan Hotel, Denver.

13-16 American Institute of Chemical Engineers, Fairmont and Mark Hopkins hotels, San Francisco.

15-16 American Petroleum Institute, executive committee, Greenbrier Hotel, White Sulphur Springs, W. Va.

16-18 National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J.

21-25 Instrument Society of America, national instrument conference and exhibit, Sherman and Morrison hotels, Chicago.

24-25 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

27-30 American Society of Mechanical Engineers, annual conference, petroleum division, Rice Hotel, Houston.

28-29 Independent Natural Gas Association of America, Shamrock Hotel, Houston.

Sept. 30-Oct. 2. American Association of Petroleum Geologists, Mid-Continent regional meeting, Masonic Building, Wichita.

OCTOBER

1- 2 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

4- 6 American Association of Oilwell Drilling Contractors, thirteenth annual meeting, Cosmopolitan Hotel, Denver.

6- 7 Texas Mid-Continent Oil and Gas Association Rice Hotel, Houston.

7- 9 National Association of Corrosion Engineers, south central region, Mayo Hotel, Tulsa.

8- 9 California Natural Gasoline Association, annual fall meeting, Ambassador Hotel, Los Angeles.

11-17 Oil Progress Week.

19-20 Independent Petroleum Association of America, annual meeting, Texas Hotel, Fort Worth.

22-23 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

26-29 American Gas Association, annual conference, Kiel Auditorium, St. Louis.

29-31 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

NOVEMBER

3- 4 Society of Automotive Engineers, national diesel-engine meeting, Conrad Hilton Hotel, Chicago.

5- 6 Society of Automotive Engineers, national fuels and lubricants meeting, Conrad Hilton Hotel, Chicago.

5- 6 American Association of Petroleum Geologists, Pacific section annual meeting, Hotel Biltmore, Los Angeles.

9-12 American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

21 National Gasoline Association of America, regional meeting, Herring Hotel, Amarillo, Tex.

MIDWEST
PREFABRICATED PIPING

SAVES LABOR

SAVES TIME

SAVES MONEY

SAVES TROUBLE

From A Simple Bend

Or Welded Assembly

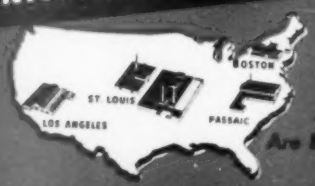
To Complete Piping Systems For Power Plant

Or Process

Call On MIDWEST

Midwest Shop-Fabricated Piping saves labor, time, money and trouble in erection. Subassemblies are always practical, with the difficult operations performed in the fabricating plant. Field welding is simplified as much as possible. All pieces are accurate in alignment and dimension . . . they are thoroughly cleaned to remove all scale and dirt . . . carefully inspected and tested . . . stress relieved when necessary . . . ready to erect quickly, easily at lowest cost. It is to your advantage to use Piping Prefabricated by Midwest.

MIDWEST PIPING SERVICE IS NATION-WIDE



4 Plants Are Better Than 1

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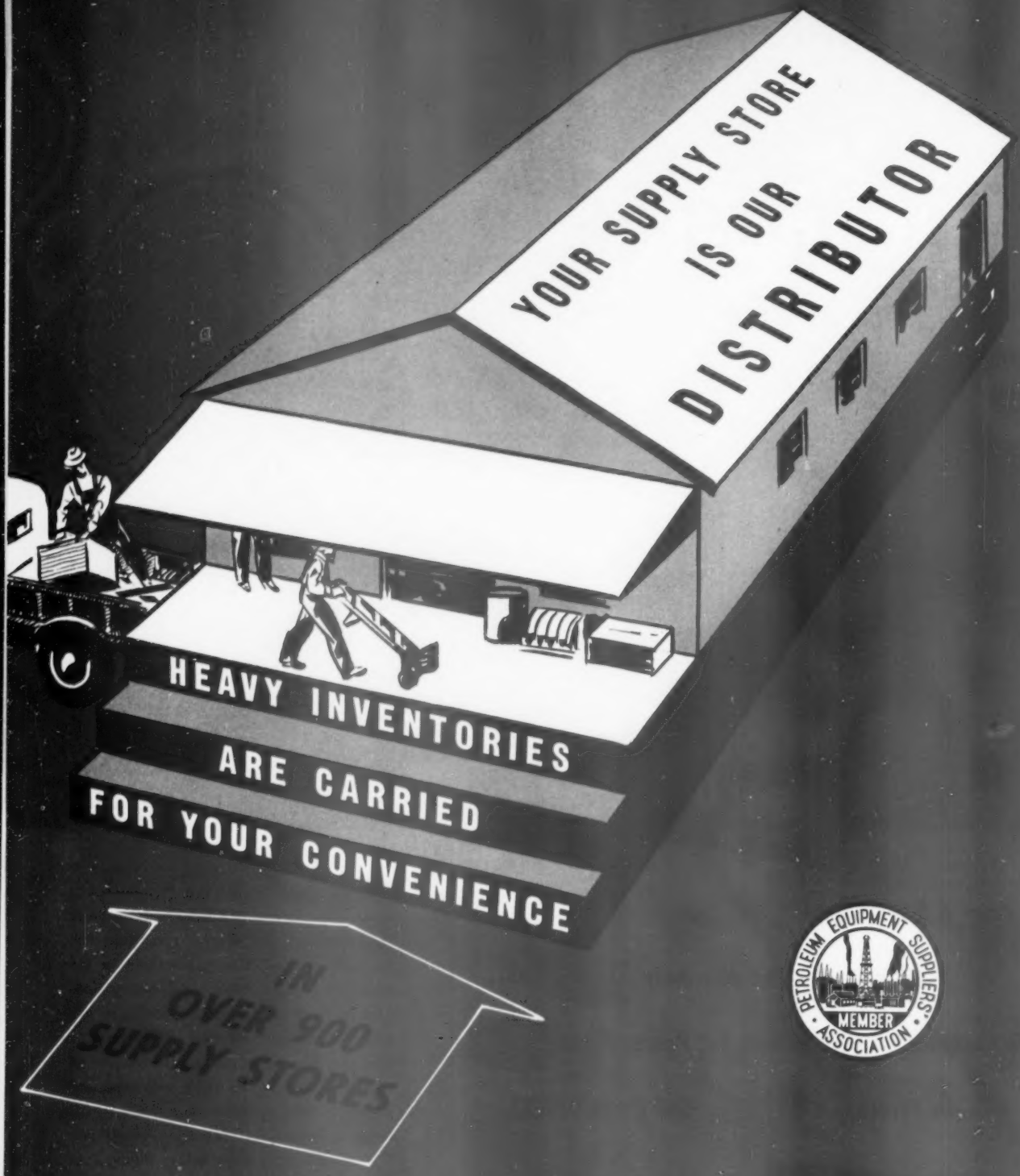

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TULSA, OKLAHOMA

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THE OIL AND GAS

JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

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JOURNALLY Speaking

What's In It

SINCLAIR OIL CORP. has just completed a costly new movie which isn't about Sinclair or the oil industry and which doesn't mention the company's name except in an acknowledgement in the subtitle. It's called "Oklahoma and Its Natural Resources," and it's one of a series of state travelogs distributed for free by the U. S. Bureau of Mines.

Since the company went to a great deal of trouble and expense to make this very fine movie, somebody is sure to ask the good old American question: "What's in it for Sinclair?"

The answer lies in the enlightened public-relations program which is spreading thoroughout the oil industry. Sinclair figures that as a good citizen it ought to help its fellow citizens know more about their country; the Bureau of Mines has helped it, and it is glad to return a favor; it got its start in Oklahoma and has extensive operations there, so it is happy to help boost the state. The movie is an indirect plug for individual initiative and the private-enterprise system. And, of course, if it stimulates tourist travel in Oklahoma, some Sinclair stations may share in the increased gasoline sales. Outside of that, there's nothing in it for Sinclair. But that's quite a bit, isn't it?

Doodlebug Test

THE oil industry, it is commonly said, badly needs a new instrument for finding oil from the surface, so it had better keep a close watch on an experiment being conducted by five Negroes in Ellis County, Texas. They have four instruments which they say can locate gold, and to prove their faith in them they are spending their evenings and week ends digging for buried Spanish treasure under a giant pecan tree.

The instruments are a "Lodestone Rod," a steel wand with pieces of precious metal on the end; a "Spanish Dip Needle," a gold-tipped compass needle on a bottle; a "Cylinder," which looks something like a flashlight battery hanging from a string; and an "M-Scope De Luxe," which is housed in a small tool box but is said to function "something like a Geiger counter." All these instruments are said to bend, dip, swing, or click near the pecan tree.

There's a legend that back in 1820 a wagonload of 3,000 gold bars en route to Galveston from a Spanish mission in Santa Fe, N. M., was buried in the vicinity to prevent capture by the Comanche Indians. An old Negro who died recently and who claimed to be the grandson of a slave who buried the bars, is said to have passed on the word that the venerable pecan tree marked the treasure spot.

That's all we know about it, but we'll wager that if those gold bars are found there will be a big revival of interest in the doodlebug business.

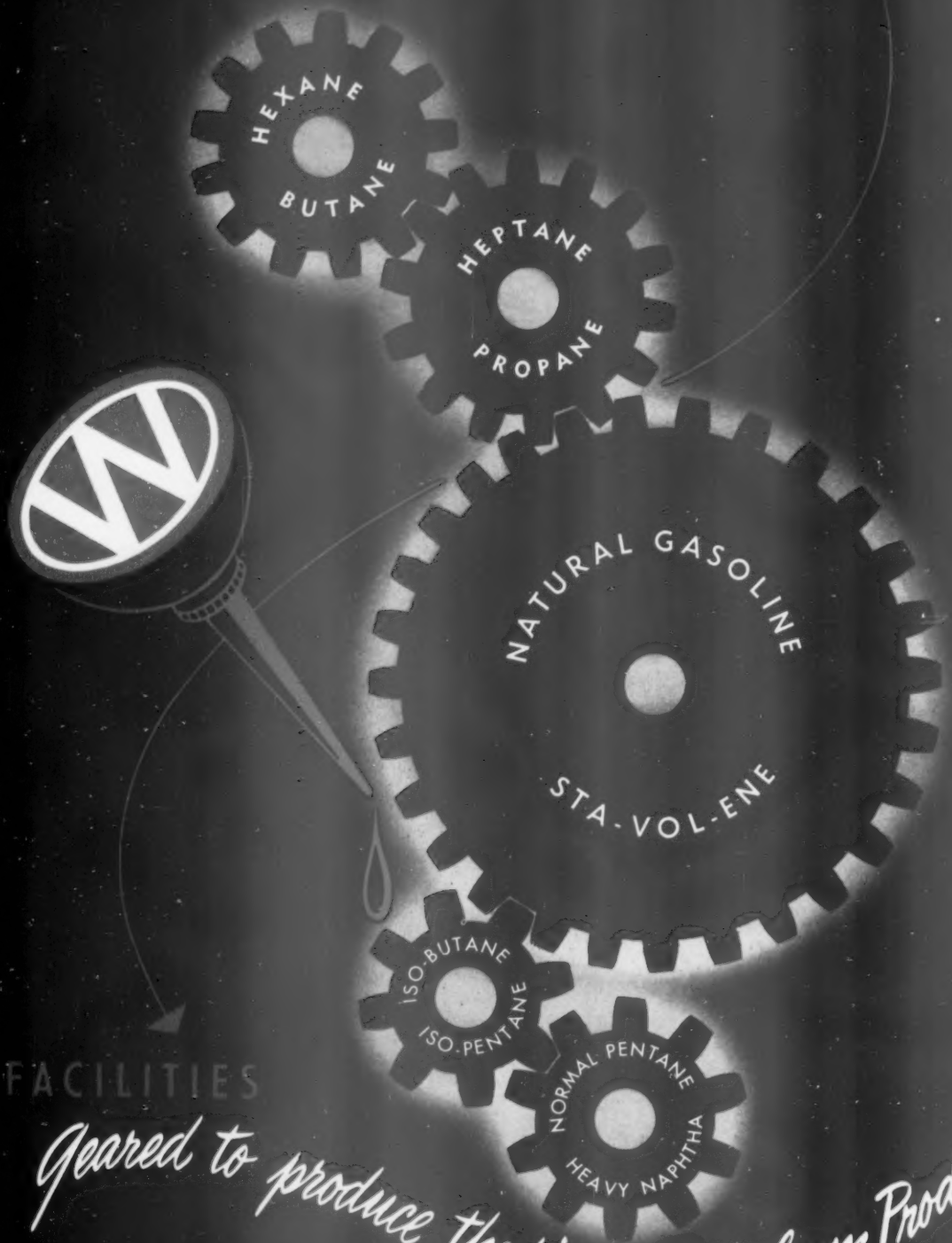
Rescue

THE combination of a stray dog, a lot of oil-field equipment, and the ingenuity of oil workers saved the life of a farm child in Elk City field, Oklahoma. The 2-year old girl fell down an abandoned well and was wedged 15 ft. below the surface. A dog's persistent barking brought the parents to the scene. A party-line telephone spread the alarm throughout the neighborhood.

In a matter of minutes, oil-field trucks started arriving at the farm. Their short-wave radios called for other equipment. Trench diggers, earth movers, and tools of all kinds showed up in a hurry. A welding crew dropped a hose down the well and kept the child alive with spirits of oxygen from the welding tank. In a couple of hours the oil crews had sunk a shaft below where the little girl was lodged. Then they tunneled under and pulled her out and rushed her to a hospital where she was revived.

A dog may be man's best friend, but oil men are mighty good neighbors, too.

Henry D. Ralph



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Alaskan oil: Exit Navy, enter private enterprise

LOOK what's going on in Alaska. Two developments up there this summer throw a lot of light on how the oil industry operates, and how oil is found and why.

In the north, the Navy is pulling out after an unsuccessful 8-year hunt for oil which cost $50,000,000 of the taxpayers' money. In the south, two oil companies are moving in under a commitment to spend a minimum of $4,000,000 of their own money during the next 10 years in a search for oil.

A PARADOX? Only to the extent that it illustrates the paradoxical thinking that dominated the Government's attitude toward oil a few years ago and which still persists in many quarters.

On the one hand the Government feared big business, so it leased its lands, including southern Alaska, only in very small tracts. On the other hand it feared a shortage of oil, so it set aside huge tracts, including northern Alaska, as federal reserves. As a consequence, neither area was developed though both are favorable for the occurrence of oil.

Came the war and an oil shortage, and the Navy moved in to explore its reserve even though advised that climate, terrain, and remoteness would make it uneconomic to get out any oil discovered at prices likely to prevail for a generation.

It can't be said categorically that private enterprise could have found oil in northern Alaska, but the Navy's failure is one more chapter in the dismal record of oil ventures of governments everywhere. Oil companies, too, have spent millions in unsuccessful explorations, but certainly no company would spend anywhere near what the Navy spent in such an economically unpromising area.

MEANWHILE the far more attractive oil-seep area of southern Alaska was virtually untested, largely because leases were obtainable only on tracts too small to justify the expense of exploration. Not until this year did the Government approve a worth-while lease block and a practical operating agreement. True, the private companies may find no more oil in southern Alaska than the Navy found in northern Alaska, but the test won't cost the taxpayers a cent. And any oil that is found can be put on the market at competitive prices.

This Alaskan saga ought to drive home to the American public this fundamental fact: The way to have oil for the nation's defense and its economy is through an oil industry actuated by private enterprise. And the way to induce the industry to develop oil is to surround it with operating conditions which furnish reasonable hope of a fair return for the tremendous investments required.

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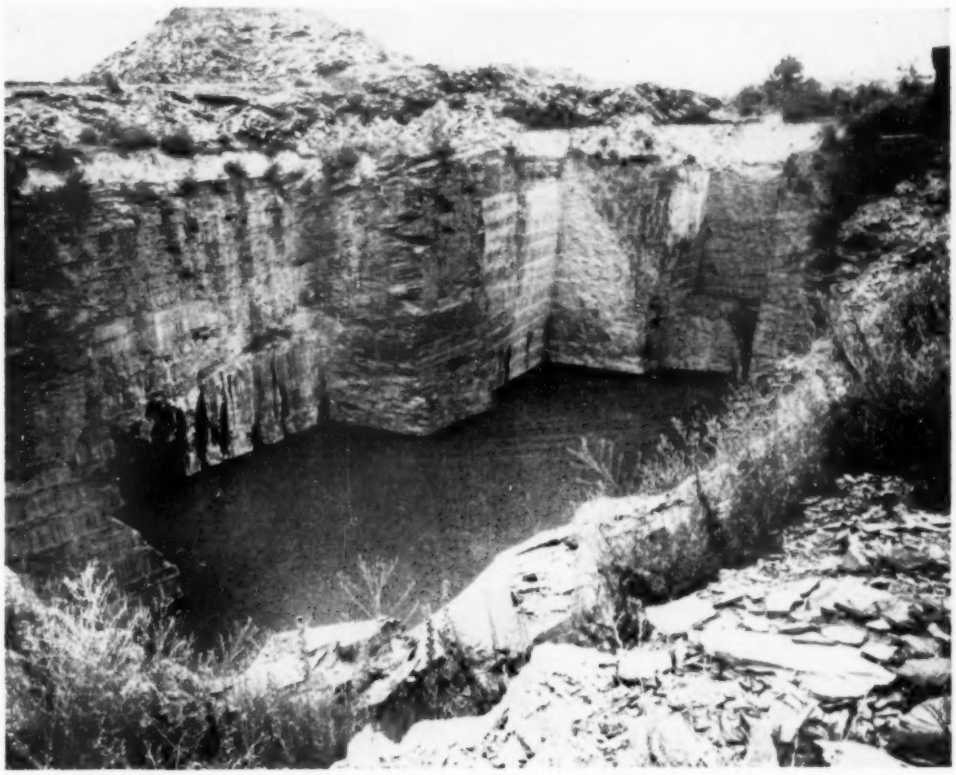
THIS WEEK



THIS HOLE in Pennsylvania may be converted by Esso Standard Oil Co. within the next year to provide storage for heating oils, a move which could point the way to a solution to the growing problem of seasonal product demand. Esso Standard visualizes either a pontoon-type floating roof or a suspended steel roof to minimize contamination. Shale pits, with straighter sides than stone quarries, offer the best prospects for large storage cavities. For details on the new development, turn the page.

PRODUCTION.—New American-Canadian company announces development of new method for separating oil from Athabasca tar sands. . . . Process uses centrifugal force on mixture of oil, sand, and water to separate oil. . . . ¶Texas Railroad Commission continues shutdown of flaring wells in Spraberry trend, puts nonflaring wells on 9-day producing schedule for July. . . . Completion of current pipe-line construction programs in area expected to solve gas-disposal problem and permit full operation of field. . . . ¶Richfield and others unitize Dibblee zone of South Cuyama field, say gas-repressuring program will result in additional recovery of 40,000,000 to 80,000,000 bbl. . . .

EXPLORATION.—Amerada's new Fryburg pool discovery, the first substantial producer in North Dakota off the Nesson anticline, regarded as most significant development on the Dakota side of Williston basin since oil was discovered at Beaver Lodge. . . . The Billings County wildcat, 55 miles from nearest production, flowed 392 bbl. of 40.1°-gravity crude in initial 24-hour gage. . . . ¶Coastal Caribbean signs pact with European financial group by which the latter will spend $3,000,000 in geophysical work and drilling on Florida properties of Coastal's subsidiary, Coastal Petroleum. . . .

INTERNATIONAL.—Contract let for one of world's biggest pipe-line jobs—a 1,920-mile, 4 to 10-in. products system to fuel more than 100 air fields and other military installations. . . . NATO project will be undertaken by Foster Wheeler, will cost more than $100,000,000, and will extend from northern Netherlands to French Alps. . . . ¶Government group in India urges increased exploration and refinery and pipe-line construction to narrow the gap between local production and consumption. . . . ¶Nationalization of Shell properties in North Sumatra becomes key political issue between principal parties. . . . ¶Iran increasing offers of barter arrangements in order to move nationalized oil. . . . Latest negotiations are with Cuba, Italy, and Japan. . . . ¶Bolivia sets up monopoly on imports and distribution under Y.P.F.B.

ECONOMICS.—Thirty-company report shows oil firms had higher gross incomes last year than in 1951 but net incomes were actually lower. . . . Blame laid on higher taxes, wages, and materials costs, together with lower fuel-oil prices and virtually static crude-oil price. . . . ¶Four per cent wage increase resulting from wage boost for steel workers spreads across petroleum industry. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,453,425 bbl. daily for week ended June 27, down 6,500 bbl. daily. . . . ¶Well completions for the week totaled 918 compared with 995 for previous week. . . . Wildcat completions increased 22 wells for the week to 690. . . . ¶Rotary rigs operating in the United States decreased 8 rigs for week ended June 29 to 2,642. . . .

TRENDS.—Preliminary weekly figures through June 27 show total well completions to date up 334 wells or 1.5 per cent over same period last year. . . . Wildcat completions gained 399 wells or 8.2 per cent. . . . The poor showing in total completions was due to a decrease of almost 1,000 wells for West Texas. . . . The drop in Spraberry drilling accounted for most of the West Texas loss. . . .

SLATE PIT, filled with water, was one of several surveyed by Esso for conversion to underground storage. It is located in the Penn Argyl section of eastern Pennsylvania at the foothills of the Kittatinny Mountains north of Bethlehem and Allentown.

OPERATION of the converted reservoirs will be controlled to eliminate the possibility of oil loss by maintaining the oil level below that of the surrounding water table. Maximum variation of the water table, 20 to 25 ft., will be checked continually to assure proper reservoir level by withdrawal or input of water to the bottom of the pit.

Quarry Storage for Heating Oils?

First pit considered for use would store 3,000,000 bbl. for 33 cents a barrel, help solve seasonal demand problem

George Weber

NEW YORK.—The next year may bring the first domestic application of underground reservoirs for the off-season storage of middle distillates.

Esso Standard Oil Co. last week announced that an 18-month survey had progressed to a point where the first such project is now under serious consideration.

One of a group of abandoned slate pits located in eastern Pennsylvania has been selected for possible conversion, pending completion of engineering studies. It would eventually provide for the summer storage of 3,000,000 bbl. of home-heating oil produced at the company's Bayway refinery at nearby Linden, N. J.

On the completion of cost studies, the company will shortly reach a decision on the project. If favorable, approximately a year will be required to ready the open pit for product storage.

Tremendous potential . . . In discussing the project, W. F. Thiede, Esso's assistant general manager of manufacturing, pointed to the tremendous possibilities which such large storage reservoirs offer in leveling the uneconomic peaks and valleys of seasonal refinery operation and product transportation. He believes that the economic utilization of this vast natural storage capacity existing in many parts of the country might also meet the nation's needs for the safe stockpiling of certain petroleum products essential to national defense.

Thiede was careful to point out, however, that this prospective development in no way reduces the industry's need for maintaining adequate secondary-storage capacity close to points of consumption along the East Coast and elsewhere. Underground storage would be considered primarily as "dead" storage, to supplement aboveground capacity at refineries.

For the project under consideration, heating oil would be pumped from Bayway throughout the summer months to relieve refinery tankage for the storage of gasoline and other products. On the resumption of the heating-oil season, pipe-line withdrawals from the reservoir would serve to supplement current refinery production for tanker, barge, and truck deliveries along the East Coast.

Initial survey . . . Esso was prompted to investigate the possibilities of such storage by the successful adaptation of a feldspar mine in Sweden to liquid product storage. A large number of possible reservoirs, mostly man-made, were found to exist along the eastern seaboard. They consisted of abandoned granite and slate quarries, copper and iron mines, and other similar excavations.

By virtue of their proximity to Bayway and New York, and their conversion possibilities, a group of slate quarries or pits in the Penn Argyl-Wind Gap area north of Bethlehem, Pa., was selected for first consideration. This area is traversed by one products pipe line, and two others pass nearby. It is located about 60 miles from Bayway and about 75 miles from the center of the Greater New York market.

The company has taken options on 11 such slate quarries which have a potential capacity for 13,000,000 bbl. Proper adaptation and operation for middle-distillate storage at atmospheric pressure definitely eliminates the possibility of stream pollution, and fire and explosion hazards are considered to be nil.

Pit sizes . . . The open pits under initial consideration range generally from 100 to 300 ft. in depth, from 200 to 500 ft. in length, and are 140-170 ft. wide. Their individual capacities vary from 200,000 to 5,000,000 bbl., and one 750-ft. pit would hold 10,000,000 bbl. with a 25 per cent allowance for bottom water. Within the limits of cur-

rent needs, those pits showing the greatest ratio of depth to surface area show the best economic possibility, since the major cost of conversion is construction of a suitable roof.

Reservoir qualities . . . Of the many types of abandoned works surveyed, slate quarries appear to be the best. Iron and copper mines contain sulfur compounds which might contaminate the stored product, while slate is essentially inert. Slate pits are generally rectangular in shape and have relatively clean, straight impervious walls since quarrying is done by sawing rather than blasting. The abandoned pits are partially filled with water.

Adaptation . . . A roof structure to protect oil from direct sunlight, dust, and animal life comprises the greatest conversion expense. Esso engineers, now studying the relative merits of the two most practical types, still are undecided which to select. One possibility is a floating roof composed of pontoon sections assembled to fit the irregular contour of the pit surface. The other consists of a steel plate suspended on a network of steel cables spanning the pit. Excepting for a few feet of loose overburden, the pits show relatively smooth, vertical sides, lending themselves to the floating roof principle.

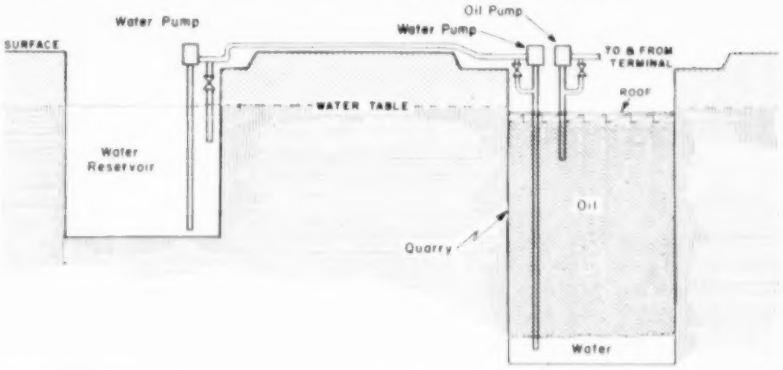
Each oil reservoir would be served by an auxiliary pit for water storage. This would supply displacement water during oil withdrawals, and would receive water during oil input. Thus the pollution streams would be avoided.

Each storage reservoir will be ringed with wells which will provide constant checks on the subsurface water level, and will be tested periodically for the presence of oil.

Operation . . . Water will be withdrawn from the bottom of the pit as oil is introduced to maintain a constant level. The oil level will always be held to a point well below that of the surrounding water table. Thus the pressure of the formation water continually will be higher than that of the liquid in the reservoir and any leakage will be inward. Water seepage will be pumped out as necessary, to maintain the constant oil level. The roof will rest directly on the liquid level and the absence of any vapor space will minimize evaporation loss and fire hazards. The accompanying drawing illustrates this operation, employing a floating type of roof.

If the company follows through on present plans, quarries and surrounding acreage will be purchased outright. The areas will be fenced and cleared of all brush for fire prevention. These precautions plus the prevention of any atmospheric or stream pollution possibilities, should render this type of underground storage completely free of any objectionable effects on the surrounding country. Esso anticipates no objections on these grounds.

Proposed Installation for Underground Storage



HOW QUARRY would serve as product storage is shown in this sketch of a proposed installation using a pontoon-type roof. Water entering the pit would sink to the bottom and as the quarry was filled would be pumped into the reservoir at left. When products were being withdrawn, water from the reservoir would be pumped back into the storage pit. This procedure would eliminate the danger of stream pollution by surface discharge of contaminated water.

Economic aspects . . . The cost of this type of storage will vary with each quarry, depending on its surface area and its proximity to pipe lines, refineries, and markets. Esso estimates that the group of slate quarries originally up for consideration will cost from $0.25 to $1.00 per barrel of storage capacity to convert. The excess cost of pipe lining oil from Bayway to storage and then back to the coast, will probably range from 7 to 10 cents per barrel. These compare with the average cost of about $2.00 per barrel of steel storage capacity. The original pit should cost about 33 cents per barrel.

Underground terminals have the added advantage of requiring less than 10 per cent of the steel needed for aboveground installations. Further savings are anticipated in depreciation and repair.

Originally, the 3,000,000-bbl. reservoir, if converted for storage, will be limited by pipe-line capacity available to Esso to the seasonal storage of only 1,500,000 bbl. But should this prototype prove as successful as expected, other quarries will be converted, and a new pipe line may be run from Bayway.

Esso representatives visualize the future possibility of a number of these vast underground-storage centers located near concentrated market areas, served by common-carrier lines for the benefit of the industry as a whole. While only home-heating oil is now under consideration, they believe that this type of storage may eventually lend itself to the storage of gasoline and other petroleum products, excluding heavy residual oil because of its pumping limitations.

Conservation and defense . . . Use of the reservoirs would promote conservation by eliminating the uneconomic processing fluctuations which often become necessary to meet peak heating-oil demand during cold winters. This would tend to stabilize crude runs and assure higher yields of the more valuable distillate products at the expense of heavy residuals. It would also preclude the blending of lighter stocks to heating oils, within specifications, to meet peak requirements. The net result should be higher efficiency with existing refinery capacity, and added conservation of petroleum.

One further aspect of underground storage of liquid products concerns national defense. Esso management believes that this possible development will permit the building of greater reserves of finished products for immediate availability in case of national emergency. The relatively constant temperature maintained in such reservoirs would minimize product deterioration and loss during long storage periods. Ease of camouflage constitutes another advantage.

It is believed that suitable man-made excavations existing at strategic points throughout the country might offer space for product storage greatly exceeding a hundred million barrels. If this should prove true—and economic—it might modify to some extent the government's estimate of the required defense "cushion" in oil production and processing capacity in this country.

New Spraberry Order

Nonflaring wells given 9 producing days in July; other wells must stay shut in until gas-use provisions made

AUSTIN.—A continued shutdown of all flaring wells in the huge Spraberry Trend Area field of West Texas was ordered last week by the Texas Railroad Commission.

The commission ordered a 9-day producing schedule for July for nonflaring wells. The order followed closely after the action of the Texas Supreme Court in making final its ruling that invalidated the commission's original order shutting in the field completely.

Under the new field order, wells whose gas is going into a pipe line after processing may produce 9 days. Other wells must remain shut in until connected with a processing plant which also is connected to a pipe-line outlet so that none of their gas is flared. All producing wells will have allowables assigned on a proration schedule, based on 121 bbl. per day as the maximum.

What order means . . . The commission estimated that about 1,100 wells now are connected to gasoline plants moving residue gas into the El Paso Natural Gas Co. line serving the field. It also estimated that a production of 125,000 M.c.f. daily would be needed to supply 100,000 M.c.f. of residue gas to the El Paso line. This would be about 44 per cent of the field's preshutdown gas production of about 280,000 M.c.f. per day.

Since the commission reduced the number of producing days to 9, this would mean that gas production would fill less than half the capacity of the El Paso line, leaving the remainder to be filled by gas from wells not yet connected to gasoline plants.

By this means, it was felt that the commission would give all operators an "equal opportunity," thus protecting correlative rights, but at the same time forbidding flaring. This also would execute the Supreme Court's mandate to "shut down a wasteful well and to regulate the flow from a nonwasteful well to protect correlative rights," a phrase contained in the Supreme Court opinion as a thing the commission must do.

Pipe-line problem . . . Principal problem in the field has been the lack of pipe lines to move residue gas to markets. At the time the field was shut in, the commission estimated that of the total gas production of 280,000 M.c.f. daily, only 60,000 M.c.f. was being utilized "beneficially." At that time El Paso Natural and Permian Basin Pipe Line Co. had completed plans for greatly expanding the gas-transmission capacity in the field but were held up by failure of the Federal Power Commission to authorize the new construction.

Since then the FPC has approved both projects. The Permian Basin line is now under construction and the El Paso expansion program is expected to get under way shortly (see accompanying story). Together they are expected to provide an outlet capacity greater than production would be now if the entire field were producing. The commission pointed out, however, that the field's history "indicates that an ever-increasing amount of casing-head gas will be produced" due to the sharp increase in gas-oil ratios and the decline in oil-producing capacity of the wells.

The commission in its order said it was its intent that as facilities are increased for diverting the casing-head gas to "legal use" that it would increase the number of producing days "commensurate with the increased facilities" until such time as the field is again opened to full allowed production.

It also scheduled a hearing for July 15 in the Driskill Hotel in Austin at which operators may present evidence of "changed conditions" which might justify exceptions to the latest order.

Big Project Approved

El Paso to kick off construction soon of lines to boost gas take from Permian, San Juan basins by 400,000 M.c.f.

EL PASO, Tex.—El Paso Natural Gas Co. is expected to begin work soon on a huge expansion program which will boost capacity of its transmission system from Texas through New Mexico to California by 400,000,000 cu. ft. of gas daily.

The company was given the green light last week by the Federal Power Commission to proceed with the $175,000,000 project. At the same time the commission approved applications of three California companies to carry out construction of about $34,000,000 in facilities to receive the gas at the California line.

The El Paso program involves laying a total of about 1,056 miles of lines to carry 300,000,000 cu. ft. of gas daily from the Permian basin of West Texas and southeastern New Mexico and 100,000,000 cu. ft. daily from the San Juan basin of northwestern New Mexico and southwestern Colorado. The added capacity will boost El Paso's total deliverability to 1.9 billion cubic feet of gas daily—of which California markets will receive 1.4 billion cubic feet. Completion of construction is scheduled tentatively for the fall of next year.

The project as approved by FPC calls for laying of a 30-in. line from the Permian basin area of West Texas extending northwest through Plains, Tex., to Gallup, N. M., just east of the Arizona line. From Gallup, a 24-in. loop would extend to Topock, Ariz., on the California border.

During the FPC hearing, Paul Kayser, president of El Paso, said the company chose the northern route because it was more economical. The southern route, from the Permian basin in West Texas through El Paso, Tucson and Phoenix, Ariz., to Blythe, Calif., is "stuffed" with lines operating at maximum capacity with compressor stations about 35 miles apart, he added.

Gas allocation . . . Of the total 400,000,000 cu. ft. of new El Paso capacity, FPC allocated 150,000,000 cu. ft. to Pacific Gas & Electric Co. for the northern California market, another 150,000,000 cu. ft. to Southern California Gas Co. and Southern Counties Gas Co. for service in the southern part of the state, and the remaining 100,000,000 cu. ft. to El Paso customers in Texas, New Mexico, and Arizona.

P. G. & E. will lay 227 miles of lines at an estimated cost of $26,700,000. Southern California and Southern Counties will lay 73 miles of lines in all at a cost of approximately $7,500,000.

Restriction modified . . . In effect, the FPC order modified a previous decision which restricted the volume of gas El Paso could sell the California com-

panies to about 1.1 billion cubic feet daily—555,000,000 cu. ft. to the Los Angeles companies and 550,000,000 to P. G. & E. El Paso asked for an amendment to the previous order in its application.

The commission also provided that, in the event one of the California firms should take less than its authorized amount, El Paso may increase its deliveries to the others.

ARROW SHOWS LOCATION of Cities Production Corp. 1 Payton, and Luse & Ice 1-A Brictson, Devonian discoveries in the shallow Payton field. The latter will be completed in the Devonian while 1 Payton was drilling ahead below 7,412 ft. on an 11,000-ft. contract depth. Cross-hatched areas on map are pre-Permian producing fields.

Deep Pay Confirmed

Zone under shallow Payton pool is proven productive

GRANDFALLS, Tex.—Attention of West Texas operators is focused this week on the second Devonian discovery prospect in the shallow Payton pool of Ward and Pecos counties, southern West Texas.

Luse and Ice 1-A Brictson reported a heavy flow of gas while drill-stem testing in the Devonian, topped around 6,705 ft. Gas volume was estimated at 25,000,000 cu. ft. daily through small size choke. Distillate yield was 71 bbl. per 1,000,000 cu. ft. of gas.

Location of 1-A Brictson is ¾ mile southeast of Cities Production Corp. 1 Payton, original deep discovery in the area.

Payton pool was discovered in 1937 and has seen little drilling over the past few years. Production in the field, previous to the 300,000,000-cu. ft. gas flow made by Cities Production 1 Payton early this year while drill-stem testing at 6,780 ft., has been confined to the shallow Yates sand of upper Permian age. Oil from the Yates is low in gravity and production depth is around 2,000 ft. Prior to 1 Payton, the deepest test was to 2,303 ft. which did not penetrate below the Yates sand.

Gas-Tax Rule Awaited

See-saw court struggle over legality of 2-year-old Texas gathering levy to be decided by Supreme Court this fall

AUSTIN.—Final decision as to the validity of Texas' natural-gas-gathering tax is expected early this fall.

An appeal to the U. S. Supreme Court, filed June 25 by Michigan-Wisconsin Pipe Line Co. and Panhandle Eastern Pipe Line Co. from earlier rulings of the Third Court of Civil Appeals and the Texas Supreme Court, probably will be acted upon by the nation's top court when it reconvenes after summer recess.

The two companies base their entire case in the appeal on the argument that the gathering tax—0.45 cent per M.c.f.—is a burden on interstate commerce and thus unconstitutional. They asserted that the tax, which took effect in September 1951 and since has accumulated more than $16,000,000 in protested payments, was "deliberately aimed at gas moving in interstate commerce."

"Since the burden of the tax ultimately will be borne by those persons in other states who consume the gas, the statute enables the State of Texas to achieve the politically popular result of raising revenue at the ultimate expense of citizens of other states." These citizens, the appeal continued, had no voice in determining the tax, but their representatives provided more than 150 years ago in the federal constitution that no state may take any action which has the effect of impeding the free flow of trade between the states.

Answer expected . . . The state has until July 10 to file its answer. Its arguments are expected to be essentially the same as those used successfully before the two appeals courts. These pointed out that the levy was an occupational tax which does not discriminate against interstate commerce because: (1) It applies equally to all engaged in gas-gathering in the state without reference to whether the taxed gas goes into interstate or intrastate commerce. (2) It was laid on an activity of a local character, separate and apart from the flow of commerce. (3) It is a taxable incidence which cannot be duplicated in other states should the gas go into interstate commerce. (4) It is a tax on activities for which the state, through its conservation laws, "gives protection and confers benefits."

The Panhandle and Michigan-Wisconsin cases, along with a suit filed by Amarillo Oil Co. were selected by agreement of state and company attorneys as covering all points at issue in the total 51 suits. Panhandle transmits gas both intrastate and interstate. Michigan-Wisconsin picks up gas near the Texas border for interstate movement. Amarillo operates only intrastate, and its case will not be disposed of until the interstate question is decided.

Three courses open . . . The Supreme Court could uphold the appellate decisions in favor of the state by review and decision. It could refuse to review the case—which would have the same effect. Or it could void the previous decisions by ruling for the companies.

If the tax finally is held to be constitutional, the millions now tied up in the Texas treasury will become available for appropriation. If the pipe-line companies win out, natural gas will be virtually tax free from the time it leaves the well-head, since the state's existing severance or production tax does not affect the pipe lines.

MID-CONTINENT

Firm Handles Kansas Holdings

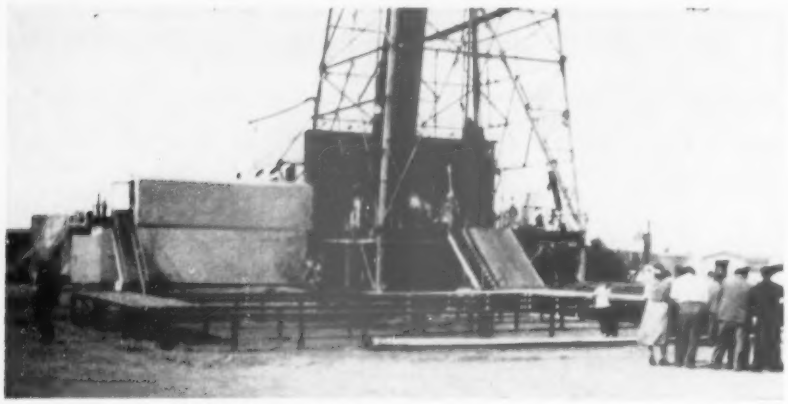
WICHITA, Kans.—Sapphire American Petroleums, Inc., wholly owned subsidiary of Sapphire Petroleums, Ltd., of Toronto, Ont., began operation of Sapphire's Kansas properties July 1.

Operational facilities will be set up in either Great Bend or Wichita by Lee Kizer of San Angelo, Tex., the firm's petroleum engineer, and Wayne Suagee, El Dorado, Ark., production engineer. The 2-year-old company owns 40 producing wells in Barton, Harvey, Kingman, and Stafford counties of Kansas plus 9 wells in Cochran County, Texas.

School Lands Leased

OKLAHOMA CITY.—The Oklahoma School Land Commission collected last week a total of $96,389.53 in bonuses for leases on 2,425.40 net acres.

Cabot Carbon Co. paid $58,638.51 for leases on five quarter-sections in the area between Sturgis-Keyes gas distillate sector and Guymon-Hugoton field. In the same area Panhandle Eastern Pipe Line Co. paid $5,072 each for two 80-acre tracts, and The Texas Co. obtained one 80-acre tract for $8,135.35.



NEW DISCOVERY in North Dakota off the Nesson anticline drew crowds of nearby farmers to the well site. The 1 May is 55 miles from nearest production and represents the first significant production off the anticline.

Big News in Williston

Amerada's rank-wildcat discovery in Billings County seen as most significant in North Dakota since Beaver Lodge

Joseph A. Kornfeld

FRYBURG, N. D.—The most significant development on the North Dakota side of the Williston basin since oil was discovered on the Nesson anticline in April 1951 is the new Fryburg pool discovery tested last week near this village in Billings County.

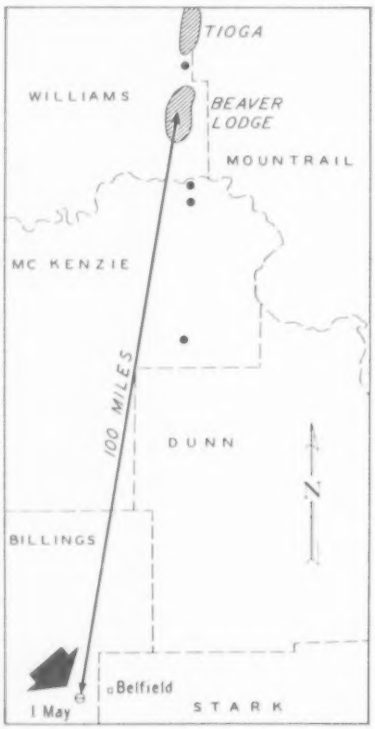
Drill site is in rank-wildcat country with no subsurface geologic control except the Stanolind Oil & Gas Co. 1 Brusich dry hole drilled 30 miles to the southeast. Nearest oil production in North Dakota is 60 miles to the north in Croff field of McKenzie County, most southerly of a chain of discoveries on the Nesson anticline extending throughout Williams, Mountrail, and Burke counties. The Fryburg discovery is about 55 miles east of nearest Montana production, Shell Oil Co.'s Pine Unit field on the 120-mile-long Cedar Creek anticline.

Last week, the discovery well, Amerada Petroleum Corp. 1 Herman May, C NW NE 9-139n-100w, flowed 392 bbl. of 40.1°-gravity oil per day through a 24/64-in. choke. This was the initial 24-hour gage ending at 10 a.m. June 26. Initial gas-oil ratio was 493 cu. ft. per barrel. Total fluid was 559 bbl., which included acid water.

There was less than 1 per cent cut on the crude. At week's end, Harry B. Owens and Gareld O. Webb, Amerada field engineers, were running bottom-hole pressure bomb, productivity index, and gas-oil ratio tests.

Flow is from 63 ft. of open hole treated with 5,000 gal. of regular acid. Total depth is 9,466 ft. and the 7⅝-in. protection pipe was set at 9,403 ft.

Mission Canyon . . . Producing horizon is in the upper part of the Mission Canyon member of the Madison group of Mississippian age. However, the well has not yet penetrated the zones in the Mission Canyon which produce to the north in the Beaver Lodge, Tioga, and other fields on the Nesson anticline.



Earlier, this discovery encountered a flow of high-pressure inert gas at about 7,394 ft., which is 14 ft. in the Minnekahta zone of Permian age (Phosphoria equivalent).

The discovery is on a block held by Amerada in which Northern Pacific Railroad has a net 5 per cent interest. The Northern Pacific traverses the Amerada block from east to west.

The block was assembled by Thomas W. Leach of Bismarck, N. D., for Amerada after a reflection-seismograph survey indicated presence of a pronounced anticline trending northeast-southwest. The block skirts the southeast edge of the Theodore Roosevelt National Park, and the park's southeastern limit extends to within 1½ miles of the well.

Sinclair Oil & Gas Co. has a block of 960 acres lying less than 2 miles south of the well. Other important acreage holders in the area include Cities Service Oil Co., Skelly Oil Co., Sun Oil Co., Superior Oil Co., and The Texas Co.

Drilling data . . . A 15-in. surface hole was cut and 10¾-in. surface pipe set at 622 ft. and cemented with 500 sacks. A 9⅝-in. hole was cut to 9,402 ft. where 7⅝-in. protection casing was set and cemented with 1,475 sacks. There was some lost circulation at 7,370 ft.

A 6¾-in. hole was carried to present depth of 9,466 ft. The mud used in drilling into the producing formation had a weight of 10.1 lb./gal. and a viscosity of 52 seconds. Deviation at 8,353 ft. was ¾° and at 9,325 ft. only ¼°. Two successive drill-stem tests were conducted from 9,386 to 9,466 ft. prior to open-hole production test.

For a discussion of the entire area and other developments of interest, see page 137.

Colorado Leases Sold

DENVER. — El Paso Natural Gas Co. has purchased a half interest in 100,000 acres of proved and semi-proved leases in the Twin Butte Unit area of Garfield and Rio Blanco counties, Colorado.

The purchase was made from Frank Buttram, Oklahoma City, who will retain an overriding interest in the spread. Greenbriar Oil Co. and Mendota Oil Co. each own a quarter interest in the acreage. Presently a third test is being drilled in the area. The first two wells, both of which were completed as sizable gassers, now are shut in.

Stronger Laws Urged

Conservation statutes need tightening, R.M.O.G.A. told

SALT LAKE CITY.—Strengthening of conservation laws, encouragement of unitization agreements, and public support of legislation providing "proper regulatory controls" in the Rocky Mountain states were urged here last week by Forrest M. Darrough, vice president of Carter Oil Co., Tulsa.

Addressing the midyear meeting of the Rocky Mountain Oil and Gas Association, Darrough said many states "notably Wyoming, Colorado, Montana, and North Dakota," have passed conservation statutes which encourage the oil industry to continue its exploration efforts.

"Experience will show," he added, "a need for strengthening of conservation statutes already adopted. The people of Utah should support every reasonable effort to enact legislation to provide proper regulatory controls. . . . Utah's interests and those of industry are common—we must work together to protect the rights of all."

Proper spacing of wells is essential, Darrough said, to eliminate drilling of unnecessary and expensive wells. When efficient operation of a field indicates unitization is necessary, then unitization should be encouraged to prevent underground waste, he added.

In Utah, alone, the Carter executive said, the oil industry spent millions of dollars to find new crude reserves of 23,630,000 bbl. Because of the high cost of drilling, the lack of accessible transportation outlets, and other factors, new regulatory legislation is desirable, he said.

Carter, alone, he continued, had spent more than $14,000,000 in exploration and development in Utah at the beginning of this year and to date has a total return on the investment of less than $750,000.

Conservation aids financing . . . R. Elmo Thompson, executive vice president of the First National Bank, Tulsa, told the association that enactment of oil and gas conservation laws has given the petroleum industry an air of "financial respectability."

Thompson said conservation laws improve the security of underground reserves pledged as credit to a bank by giving assurances "that adjoining leasehold owners will not drain from the pledged property a greater proportion of the underground inventory than is pledged to the bank for credit."

INDUSTRY AFFAIRS

Free Industry Assured?

Wescoat points to "big steal" charges on tidelands, says industry seriously threatened unless oil men fight back

COLORADO SPRINGS.—A free and competitive oil industry in the future is far from certain. Unless oil men work at home to influence public opinion and support policies in the public interest, business soon may be heading again toward a completely "and perhaps permanently" government-controlled economy.

This solemn warning was sounded before the annual meeting of the Petroleum Equipment Suppliers Association here last week by L. S. Wescoat, chairman of the board of the American Petroleum Institute and president of Pure Oil Co.

Wescoat made a scorching attack on demagogs and "politicians with an eye to votes" who tagged the tidelands-return bill as a "big steal" and cited this propaganda campaign as proof that the oil industry, even with a pro-business administration in Washington, is in a precarious position.

The story of the "big steal" he said, must be met solidly with the truth in order to prevent damage to "any one who has an interest whatever in a free and prosperous petroleum industry."

"For two decades rabble-rousers have blamed business for everything that went wrong. Unless business men today do their part at home and in the field of public opinion to support policies in the public interest, they will be back in the dog house," Wescoat said.

"The months ahead," the A.P.I. executive said, "will test our faith in freedom and the ability of free men to prosper in a competitive market. You need no reminder how close we have been to a completely and perhaps permanently government-controlled economy, in which politicians with an eye to votes fix wages, prices, rents, interest rates, foreign exchange, exports, imports, and by taxes, decide how much or little a business may be permitted to earn or its shareholders to keep. . . .

"An administration friendly to honest business is now on trial in Washington. But business is also on trial on Main Street. A real danger lies in the fact that too many business men are 'letting George do it' in public office."

"Big steal" rebuttal . . . Refuting the "big steal" charges against proponents of quitclaim legislation, Wescoat said that even if the controversial areas should eventually produce as much as 5 per cent of the presently estimated reserves in the entire country, the royalties over a 20 to 50-year period "would amount to less than $500,000,000, which would run the federal Government something over 2 days."

Wescoat, who was chairman of the National Petroleum Council committee which made a detailed study of oil prospects in the "tidelands" *(The Oil and Gas Journal, June 8, page 62)*, ridiculed politicians' estimates of the value of the offshore areas as "fantastic."

"The smallest figure mentioned is $118 billion and it goes from there up to $300 billion, and more." The figures, he said, were "wild guesses of ultimate gross values, where as net royalty revenues to either the federal or state governments would be only one-eighth of the gross."

Declaring that huge investments must be risked to evaluate the offshore areas' potential, Wescoat said the amount spent "may be more or less than the value of the oil and gas produced."

Actual prospects . . . The true picture of the value of the offshore areas, he said, may be found in the NPC estimate that by the end of 5 years a possible production of about 200,000 bbl. a day of oil and 600 to 800 million cubic feet of gas daily might be obtained. "This is no more than 3 per cent of total domestic production today and is predicated upon the existence of the most favorable conditions.

"It is important that the truth be told with respect to these ("big steal") charges. If not, the bad feeling sought to be developed against President Eisenhower and the petroleum industry by this demagogic assault could assert itself in many ways" to the damage of anyone interested in the petroleum industry, Wescoat said.

Bovaird to Head P.E.S.A.

COLORADO SPRINGS.—Davis D. Bovaird, president of Bovaird Supply Co., Tulsa, was elected 1953-54 president of the Petroleum Equipment Sup-

D. D. BOVAIRD

R. S. DURKEE

pliers Association at the group's annual meeting here June 30.

Rodney S. Durkee, president of Lane-Wells Co., Los Angeles, was elected vice president.

The association also elected 55 directors, including a director emeritus of the Pacific district—D. S. Faulkner, of National Supply Co., Torrance, Calif.

Delhi, Taylor Merger Planned

DALLAS.—Plans to merge Delhi Oil Corp. and Taylor Oil & Gas Co. were revealed by C. W. Murchison, Delhi president, at a special meeting of stockholders here recently.

Murchison said the company owns about 1,000,000 shares of Taylor, or nearly half of the 2,271,513 Taylor shares outstanding. He pointed out that an additional 300,000 or more shares are in "friendly hands." He explained the desirability of the proposed merger by pointing out that Taylor has "about $10,000,000 a year available to be put back into the ground."

He said the proposal has not yet been submitted to Taylor stockholders.

During the special meeting the stockholders unanimously approved a reorganization plan under which holdings of Canadian Delhi Oil Co., Ltd., will be distributed among Delhi stockholders. The purpose of the move was to separate Delhi's domestic and Canadian operations. Also, it would serve as an aid to Canadian Delhi if it had to borrow money to construct a proposed pipe line of Trans-Canada Pipe Lines, Ltd., a wholly owned subsidiary of Canadian Delhi *(The Oil and Gas Journal, June 15, page 83)*.

Canadian Delhi will become Canadian Delhi Petroleum, Ltd., and new stock will be issued to holders of old stock on a one-for-one basis.

Stanvac Move Blocked

NEW YORK.—Opposition of nearby property owners has blocked plans of Standard-Vacuum Oil Co. to move its headquarters from downtown New York to a site in suburban Westchester County.

The company has withdrawn a rezoning application which it had pending before the Town Board of Rye, N. Y. Company officials cited "zoning law complications," but it appeared that the company's decision was prompted by protests and threats of court action from estate and other property owners near the 25-acre site.

Standard-Vacuum had planned to erect a modern office building on the property. The company is known to be interested in a new headquarters location and may still take a suburban site.

Standard-Vacuum is now located in three downtown New York office buildings with the largest part of its personnel in the original Standard Oil Building at 26 Broadway. Socony-Vacuum Oil Co., Inc., which with Standard Oil Co. (N.J.) owns Standard-Vacuum occupies most of 26 Broadway.

Good Year for Taxes

Oil industry has virtually escaped higher state levies this year, but two special legislative sessions pending

THE petroleum industry has fared well so far this year in its brushes with the legislatures of the oil-producing states.

Although special sessions are considered possible in two states to consider additional taxes on the industry, only one state passed a petroleum tax during the regular session.

This tax was levied by North Dakota's legislature and represents the first tax on the oil-production industry in the newest oil state. At the same time, the legislature provided for a depletion allowance of 27½ per cent.

Special sessions are considered possible in Mississippi and Texas, both of which may be asked to levy additional taxes on the oil industry. Following is a state-by-state rundown of legislative acts affecting the oil-tax situation:

. . . **Colorado:** New oil and gas production tax ranging from 2 per cent for low-volume wells to a top of 5 per cent, enacted by the legislature to raise an estimated $2,000,000 in additional revenue annually.

. . . **Kansas:** Bill levying a 3 per cent severance tax on oil and gas production, killed by the legislature. The legislature also rejected a proposal to submit such a tax measure to a public vote.

. . . **Mississippi:** Special session of the legislature expected to be called this autumn by Governor White to consider request for an increase in state oil and gas severance taxes from 6 to 8 per cent of well-head value.

. . . **Montana:** Bill raising the state's license tax on oil producers from 2 to 4 per cent, rejected by the legislature.

. . . **Nebraska:** Bill imposing new severance tax on oil and gas, rejected by the legislature.

. . . **North Dakota:** Bill providing for a 4¼ per cent gross production tax on crude oil and providing a 27½ per cent depletion allowance, enacted by the legislature.

. . . **Oklahoma:** Proposed 1-cent gas-gathering tax and a proposed constitutional amendment to levy a 2-cent severance tax on natural gas at the well head, both rejected by the legislature.

. . . **Texas:** Special session considered possible, depending upon outcome of Supreme Court appeal on .45-cent gas-gathering tax enacted in 1951 *(see Southwest)*. If this tax should be invalidated, it is expected that the legislature would revive a bill it rejected during the regular 1953 session which would increase taxes on all natural resources by levying about $15,000,000 more annually on oil production, $7,000,000 on natural-gas production, and $37,000,000 on refineries.

. . . **West Virginia:** New severance tax on coal, gas, oil, and other natural resources, designed to raise an additional $18,000,000 annually, rejected by the legislature. The bill would have fixed these levies: crude oil, 25 cents per barrel; gas, 1 cent per M.c.f.

Oil Wages Rise

Flat boost of 4 per cent spreading through industry

A GENERAL 4 per cent wage increase was in the making in the oil industry throughout most of the country last week.

Several companies had granted the wage boosts to all employes, others had offered the increase and were negotiating with union representatives, and others were considering making the move.

Unlike previous general increases, it was understood this one is not tied to the cost of living but is a result of the recent steel-industry wage boost of 8½ cents an hour. The consumer price index of the Department of Labor has risen less than 1 per cent during the last 12 months, and the all-commodity index of the Department of Commerce has shown a slight decline during the period.

The 4 per cent boost was initiated by Socony-Vacuum Oil Co., Inc., Humble Oil & Refining Co., Esso Standard Oil Co., and Interstate Oil Pipe Line Co. met the increase almost immediately, and indications were that virtually all firms would shortly announce adjustments. In general the increase was an across-the-board 4 per cent, but some companies said they would include a certain minimum increase for low-salaried employes.

In California wage increase "requests" were served on Standard Oil Co. of California and Union Oil Co. Barney McMahon, representative of the Independent Union of Petroleum Workers, said the existing labor contract will expire August 26. The union represents about 7,000 workers. McMahon did not disclose the amount of the increase asked, but said the wage requests were based on a study of wage patterns in the steel and automotive industries.

Florida to Be Tested

European firm contracted for large-scale program

NEW YORK.—Contracts calling for exploratory operations in Florida have been concluded between Coastal Caribbean Oils, Inc., and Cie. Transeuropeene des Petroles, representing several large European financial groups active in oil operations.

Coastal Caribbean has signed contracts with Cie. Transeuropeene providing for the latter company to spend $3,000,000 in geophysical work and drilling on certain of the properties in Florida of Coastal Caribbean's wholly owned subsidiary, Coastal Petroleum Co., according to Joseph H. Himes, president of Coastal Caribbean. It is planned to begin the geophysical work in less than 60 days.

The contracts call for immediate expenditure of $500,000 in seismic surveys on approximately 2,300,000 acres of Coastal Petroleum's State of Florida water-bottom leases. These operations will require about 12 months of continuous work and will cover offshore areas along the west coast of Florida between Tampa and Naples. It will also include a 650,000-acre block along the Panhandle area of Northwest Florida from Apalachicola Bay eastward to Apalachee Bay.

Upon completion of the seismic work, the contract contemplates a drilling program involving the expenditure by Transeuropeene of a minimum of $2,500,000. Through continuous drilling that company may earn an undivided one-half interest in as much as 1,250,000 acres.

A well is to be drilled on each of 10 drilling blocks, the size of which will vary between 75,000 and 125,000 acres depending on well depth. After completion of the first well on each block, the acreage so assigned will thereafter be jointly owned and operated by the two companies.

Industry Briefs

SHREVEPORT.—Louisiana Natural Gasoline Corp., Shreveport, is reported high bidder for oil and gas leases on two tracts of land at Barksdale Air Force Base, Bossier Parish, Louisiana. According to the Bureau of Land Management, the company bid $573,212 for 1,042 acres and $453,288 for 824 acres.

SARNIA, Ont.—The new $3,000,-000 plant of Cabot Carbon of Canada, Ltd., was formerly opened here June 26 by Hon. Douglas C. Abbott, federal minister of finance. The plant, the first Canadian producer of oil-furnace carbon black, will have an ultimate output of 25,000,000 lb. a year.

STILLWATER, Okla. — A 3-year study aimed at solving the problem of pressure waves in pipe lines will be undertaken at Oklahoma A. & M. College. The project, to cost $115,000, is sponsored by Interstate Oil Pipe Line Co., Shreveport; Service Pipe Line Co., Tulsa, and several other firms. The new project will be a continuation of a previous study in which A. & M. research personnel developed a method of analyzing pipe-line operation to provide valuable data in designing and building pipe-line systems.

NEW YORK.—A proposal that the Division of Marketing of the American Petroleum Institute conduct a series of regional meetings each year in addition to the usual midyear and annual meetings will be studied by a special committee headed by Herbert Willetts, vice president of Socony-Vacuum Oil Co., New York.

PROGRAM PARTICIPANTS at Dartmouth College were (left to right) Col. J. Frank Drake, Dr. Robert E. Wilson, Douglas McKay, President John Sloan Dickey of Dartmouth, and President Paul H. Giddens of Hamline University.

First Analysis of Crude Commemorated

HANOVER, N. H.—A bronze tablet commemorating 100th anniversary of the world's first scientific examination of crude was unveiled at ceremonies held at Dartmouth College June 26.

In dedicating the plaque, Dr. Paul H. Giddens, president of Hamline University, St. Paul, Minn., stated the historic analysis of an oil spring by Dr. Dixi Crosby and Prof. Oliver P. Hubbard for commercial possibilities, led to the drilling of the first commercial oil well in the vicinity of Titusville, Pa.

Dr. Robert E. Wilson, Standard Oil Co. (Ind.), board chairman, delivered the principal address in which he cited the advances made by the oil industry during the past 100 years. Other speakers included Secretary of Interior Douglas McKay, New Hampshire's Gov. Hugh Gregg, John S. Dickey, Dartmouth president, and Col. J. Frank Drake, Gulf Oil Corp. board chairman *(The Oil and Gas Journal, June 15, page 83.)*

Gross Up, Net Down

That's the oil industry's financial story for '52; higher taxes, wages, and materials offset bigger business volume

TOTAL income of 30 selected oil companies was 6.3 per cent greater in 1952 than in 1951 but net income was off 3.3 per cent, according to the annual financial analysis of 30 oil companies by Fredrick G. Coqueron of the petroleum department of The Chase National Bank.

Total operating and nonoperating income of the 30 companies in 1952 amounted to $19,458,000,000 compared with $18,307,000,000 in 1951. In contrast, net income dropped $70,000,000 from $2,090,000,000 in 1951 to $2,020,000,000 in 1952. Comparisons of the combined income statements for 1952 and 1951 are shown in Table 1.

The lower net income in 1952 was due principally to increases in taxes, wages, and material costs with no significant changes in crude prices but with lower fuel-oil prices. Also, charges for capital extinguishment were at the highest level since the end of the war.

Even the lower net income benefited from nonrecurring factors, including increased profit from sale of assets and excess profits tax credits, that amounted to $41,000,000. If these items were eliminated, the reported net income for 1952 would be reduced to $1,979,000,000 for a decrease of 5 per cent from 1951.

Also, the reported earnings are overstated because current capital extinguishments do not provide for replacement at present costs of properties and facilities which are being used in current operations.

The excess of capital expenditures over charges for capital extinguishment since the end of the war reflects both the volumetric growth of the industry and the inadequacy of the current charges. (See Table 2.)

Foreign income up . . . An increasingly larger percentage of the net income of the 30 companies has been due to earnings from foreign operations. In 1951, the total net income of $1,739,000,000 included $393,000,000 in earnings from foreign operations or 22.6 per cent. The ratio climbed to 26 per cent in 1951 and to 31.1 per cent in 1952. Data are shown in Table 3.

This segregation of earnings between domestic and foreign operations shows that net income from foreign operations increased 15.4 per cent from 1951 to 1952 while earnings from domestic operations decreased 10.0 per cent.

Where the money went . . . The distribution of the average income dollar of the 30 companies is shown in Table 4. Operating costs and expenses took 72.5 cents of the income dollar in 1952 compared with 70.3 per cent in 1951.

Charges for depreciation and depletion amounted to 9.6 cents in 1952 for a gain over the 8.7 cents in 1951.

Dividends to stockholders in 1952 amounted to $887,000,000 to establish a new all-time record, but since total income was up in 1952, dividend payments did not represent any larger part of the income dollar in 1952 than in 1951.

Cash dividends to holders of preferred and common stock represented 43.9 per cent of earnings in 1952 compared with 40.1 per cent in 1951. The 1953 percentage was the highest since 1945 when the 30 companies paid out 48.5 per cent of net income to stockholders.

The companies reinvested in the business 5.8 cents of the income dollar in 1952 compared with 6.8 cents in 1951.

Report on assets . . . Total gross assets of the 30 companies at the end of 1952 was $22,232,000,000, including fixed assets of $12,601,000,000 in property, plants, and equipment.

Coqueron estimated that gross assets employed by the entire United States petroleum industry amounted to $40,000,000,000 at the end of 1952. Of this amount, $30,700,000,000 represented investments in property, plants, and equipment.

Capital expenditures for property, plant, and equipment by the entire petroleum industry of this country in 1952 was estimated at $3,800,000,000 by Coqueron.

TABLE 1—COMBINED INCOME STATEMENT OF 30 OIL COMPANIES
(Millions of dollars)

	1952	1951	Per cent change
Gross operating income	19,015	17,939	+ 6.0
Nonoperating income	443	368	+ 20.4
Total income	19,458	18,307	+ 6.3
Operating costs and expenses	14,109	12,869	+ 9.6
Taxes, other than income taxes	481	449	+ 7.1
Depreciation, depletion, etc.	1,767	1,511	+ 16.9
Interest and discount on debt	80	69	+ 15.9
Contingencies and other charges	21	7	+200.0
Total deductions	16,458	14,905	+ 10.4
Net income before income tax	3,000	3,402	− 11.8
Estimated income taxes	886	1,219	− 27.3
Income applicable to minority interests	94	93	+ 1.1
Net income	2,020	2,090	− 3.3

TABLE 2—CAPITAL EXPENDITURES AND CHARGES OF 30 OIL COMPANIES
(Millions of dollars)

	Capital expenditures	Charges*	Excess of expenditures
1946	1,371	763	608
1947	2,066	872	1,194
1948	2,696	1,146	1,550
1949	2,275	1,224	1,051
1950	1,889	1,258	631
1951	2,527	1,511	1,016
1952	3,100	1,767	1,333
Total	15,924	8,541	7,383

*Amounts charged to earnings to provide for capital extinguishments including depreciation, depletion, amortization, dry holes, and property retirements.

TABLE 3—EARNINGS FROM FOREIGN OPERATIONS OF 30 OIL COMPANIES
(Millions of dollars)

	1952	1951	1950
Earnings from foreign operations	628	544	393
Total net income	2,020	2,090	1,739
Per cent from foreign	31.1	26.0	22.6

TABLE 4—DISTRIBUTION OF DOLLAR INCOME OF 30 OIL COMPANIES
(Cents from each income dollar)

	1952	1951
Operating costs and expenses	72.5	70.3
Depreciation, depletion and other charges	9.6	8.7
Taxes, income and other	7.0	9.1
Income applicable to minority interests	0.5	0.5
Dividends to stockholders	4.6	4.6
Reinvested in business	5.8	6.8
Total	100.0	100.0

Imports Drop

Crude, products shipments down 35,000 bbl. in April

IMPORTS of crude and petroleum products decreased in April and exports increased according to data compiled and released by the Census Bureau of the Department of Commerce.

Total imports into the United States averaged 991,000 bbl. daily in April compared with 1,106,000 bbl. daily in March. Imports for the month were only 29,000 bbl. daily greater than in April last year, the smallest gain over the previous year since February 1952.

Crude imports averaged 617,000 bbl. daily, down 35,000 bbl. daily from March. Most of the reduction was in receipts of Middle East crude. Imports from the Persian Gulf producing areas averaged 229,000 bbl. daily compared with 262,000 bbl. daily in March.

Only 13.6 per cent of the total crude imported was under 25° gravity.

Exports boost . . . Exports from continental United States, excluding shipments to territories, averaged 453,000 bbl. daily compared with 391,000 bbl. daily in March and 461,000 bbl. daily in April 1952.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Apr. 1953	Mar. 1953	Apr. 1952
Crude—			
Mexico	441	133	862
Colombia	1,197	1,082	1,685
Venezuela	8,507	9,616	10,908
Kuwait	2,785	3,903	1,379
Saudi Arabia	3,531	3,268	1,816
Iraq	355	343	
Qatar	202	593	203
Canada	154	205	336
Far East	1,344	1,078	173
Total crude	18,516	20,221	17,362
Daily average	617	652	579
Products—			
Residual fuel	10,519	13,125	10,473
Other products	699	932	1,011
Total products	11,218	14,057	11,484
Daily average	374	454	383
Total all oils	29,734	34,278	28,846
Daily average	991	1,106	962

EXPORTS*

	Apr. 1953	Mar. 1953	Apr. 1952
Crude	2,832	2,171	3,340
Gasoline	3,235	2,504	2,454
Kerosine	857	727	613
Distillate fuel	2,942	3,072	2,766
Residual fuel	1,971	1,724	2,243
Lube oils	936	1,138	1,285
Other products	823	787	1,133
Total all oils	13,596	12,123	13,834
Daily average	453	391	461

*Excludes shipments to territories.

CANADA

Athabasca Solution?

New American-Canadian company reveals development of centrifugal process for separating oil from Alberta sand

TORONTO.—Development of a centrifugal process for separating oil from the Athabasca tar sands of northern Alberta was announced here June 30 by a new company backed by United States and Canadian interests.

The privately financed company is headed by Stanley M. Paulson as president. Eugene du Pont, Wilmington, Del., is vice president. Other directors are F. Thomas Barton and William J. Casey, New York, Gordon R. Coulson, Calgary, inventor of the process, Harold Egan and Richard M. Harris, Halifax, and Edward A. Skae and William Clay Ford, Detroit.

The company's announcement said: "Mr. Coulson, in association with Mill Creek Co., Ltd., Calgary, has developed and patented a new method of recovering oil from the oil sands. The method is not complex and has been patented in Canada and in Trinidad and Tobago, other areas with similar formations. Other patents are pending in the United States, British Isles, Sweden, West Germany, France, Japan, Venezuela, and Colombia.

"Briefly the method consists of applying centrifugal force and pressure to a diluted body of oil, sand, and water, in such a way as to cause the oil to free itself from the solids and water.

"The oil is delivered in a solid-free, practically water-free condition, ready for refining, and the sand, which is mostly pure silica, is carried to waste, or can be delivered to manufacture of other materials."

The method, the company said, does not contemplate a large central plant, but rather small compact units of large capacity.

What is involved . . . The Athabasca sands extend for more than 100 miles along the Athabasca River and its tributaries and have been estimated to contain from 100 to 300 billion barrels of oil. During the last year and a half several companies have obtained acreage in the area, and experiments have been under way on separation methods.

Presently known separation methods have not, in general, been considered economic, although some advantage could be gained by extremely large-scale operations.

R. G. Follis, board chairman of Standard Oil Co. of California, who was in Canada recently with other officials for a company board meeting, said Socal had investigated the Athabasca deposits but that it was felt that these and shale deposits in the United States are not yet ready for development.

New Plant Planned

Site next to refinery at Burnaby picked by Socal

VANCOUVER.—Standard Oil Co. of California last week announced it will build an 11,000-bbl. refinery at Burnaby, becoming the sixth company to reveal plans for expansion or new construction of refinery facilities to process crude from the Trans Mountain pipe line.

The new refinery will be built at a cost of $10,000,000 adjacent to the company's 8,350-bbl. capacity plant near the western terminal of the 120,000-bbl. per day Trans Mountain crude line. Construction will start immediately under the supervision of Standard Oil Co. of British Columbia, a wholly owned subsidiary, which will also operate the refinery. The project is expected to be completed by the end of 1954.

Other construction . . . Royalite Oil Co., Ltd., is building a 5,000-bbl. refinery at Kamloops, B. C., and expects to have it completed about the same time Standard's new refinery is ready for operation.

Shell Oil Co. of Canada and Imperial Oil, Ltd., are expanding their refining facilities in the Puget Sound area and will have construction finished when the Trans Mountain pipe line is completed late this year. Shell is doubling the daily crude capacity of its 7,000-bbl. refinery at Shellburn, and Imperial is increasing its Ioco plant's capacity from 12,000 bbl. daily to 34,500 bbl. per day *(The Oil and Gas Journal, August 25, 1952, page 87)*.

Across the border General Petroleum Corp. is building a 35,000-bbl. refinery at Ferndale, Wash., and Pacific Oil & Refining Co. is constructing a refinery at Seattle with a daily crude capacity of 10,000 bbl. Both projects will handle Canadian crude and are expected to be completed in late 1954.

Price-Hike Challenge

Major companies will be called on to defend crude and product price boosts at hearing before House committee

WASHINGTON.—Representatives of major oil companies are scheduled to go before the House Commerce Committee this week to defend recent increases in crude and product prices.

They will be asked to justify increases made at a time "when commodity prices generally are soft and reflect a firming up of the purchasing value of the dollar," committee chairman Charles A. Wolverton of New Jersey disclosed last week as he opened hearings to receive protests against the higher prices from the New Jersey Gasoline Retailers Association, National Oil Marketers Association, National Oil Jobbers Association, and the aviation, trucking and bus industries.

The committee also received testimony from a Michigan legislative committee already investigating oil prices, one member of which said he would recommend federal control of petroleum, and the bringing of the Michigan industry under the control of the public utilities authorities.

State Rep. William S. Broomfield, chairman of the committee, testified that after the lifting of price control in 1946 there were 10 increases in gasoline prices totaling 6.9 cents per gallon prior to increases of 3.9 cents in the past few weeks. Under questioning by the Wolverton committee, however, he was unable to say how those increases compared with increases over the same period in the cost of living, wages or steel.

Hadlick testifies . . . The sharpest attack on the industry was made by Paul Hadlick of the National Oil Marketers Association, who told the committee he did not wish his appearance before it to be interpreted as backing away from his formal complaint to the Justice Department charging collusion between the major companies.

That complaint, Hadlick said, will be pressed.

Reciting the increases in company profits since 1940, Hadlick said he doubted if any major oil company ever paid excess profits taxes because of the depletion allowance and the expensing of exploration and drilling costs.

Proposed questions . . . Wolverton raised a number of questions which he said he wanted the companies to answer when they testify this week. Primarily, he asked, do the increased prices truly reflect the operation of normal market factors of demand and supply or are they the result of other causes?

Apparently referring to a statement last May by M. J. Rathbone of Standard Oil Co. (N. J.) that the time was ripe for price adjustment, Wolverton suggested this may have been an "invitation" for some one else to start price increases and again raised the question how it happened that when one company increased prices "all of the others so quickly followed suit?" And, he added, did the company initiating the crude increase do so because it had been losing business to competitors, as was stated in a similar situation in 1948.

"How can the increases in crude oil, gasoline and fuel oil prices be justified today in view of our having the greatest proved reserves we have ever had, record rates of production, high inventories of products, high imports, and an excess of production capacity of 1,000,000 bbl. a day over current rates of production?" Wolverton asked.

Wolverton went back as far as the 1948 investigation to ask whether the higher price of fuel oil embraces a policy of discouraging consumers from using oil for fuel on the ground then suggested that oil cannot heat all of the homes of the country nor continue to supply virtually all the increases in the nation's energy load.

Revealing that the committe plans again to investigate proration, Wolverton asked whether domestic production has been so restricted as to jeopardize or reduce supply below current demand "through the manipulation of the rates of oil allowed to be produced by the Texas Railroad Commission or other commissions," and why the Texas commission, since the crude price increase, has raised the amount of oil which may be produced "although stating that production still exceeds demand by 400,000 bbl. daily."

The companies, the chairman disclosed, will be asked to explain in what way their sustained high earnings show a need for price increases to meet rising costs, and how the increases can be explained as an incentive to expanded drilling in view of the fact that in the first quarter 240 more wildcats were drilled this year than last.

Wolverton also called for an explanation of the effect of tanker rates, now at a low level, on heating oil prices on the eastern seaboard. Also why California has been forced to import oil to meet its needs and to increase prices.

The import situation also will be the subject of inquiry, on the basis of four questions posed by Wolverton:

. . . Will increased prices of crude in this country now be met by greater imports because crude prices are lower abroad, or will foreign prices be increased so this will not follow?

. . . Will the new foreign voluntary agreement just entered into by companies operating abroad permit the distribution of any world surplus that might arise from the return of Iranian production or other cases, just as it covered the distribution of the deficit when Abadan was shut down?

. . . Do the increased prices of gasoline and fuel oil merely represent a foretaste of the higher prices which the major companies have intimated would follow the enactment of any policy to restrict imports?

. . . Or are the higher prices for crude the result of some understanding reached to avoid enactment of a policy restricting imports?

"Based upon public statements which have been made, press comments and the present high production and inventory position of the oil industry, these price increases at this time cannot readily be understood," Wolverton said. "Nor, judging by the complaints which this committee has received, does the public understand it.

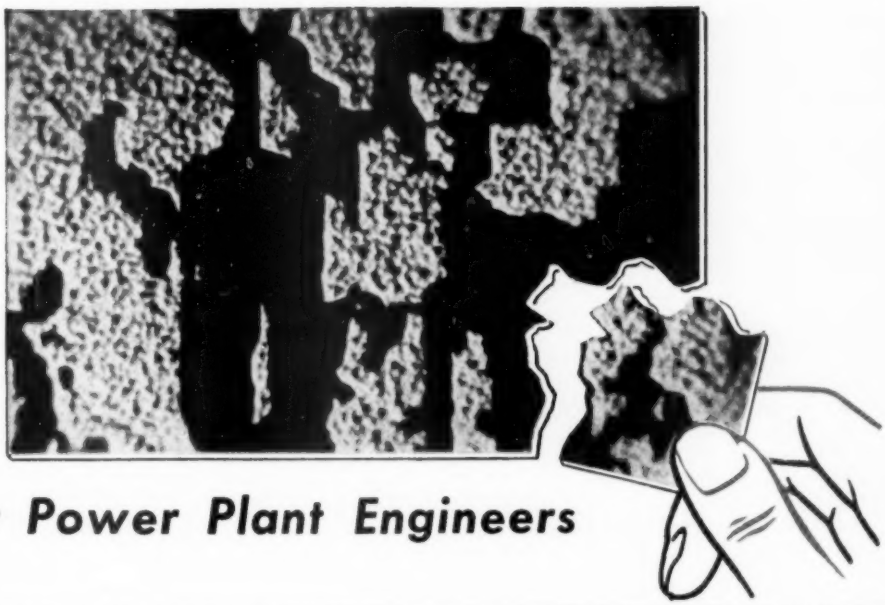
"These questions which I have outlined are simply illustrative of the need for obtaining a correct portrayal of the facts, if one is to understand how these price increases may be justified at this time. We look forward to the cooperation and help which the various witnesses appearing before us will give in clearing up the question of whether the increases are warranted."

Controls Off

NPA revokes M-46 orders governing materials use

WASHINGTON.—The second round of federal control of materials in a decade came to a virtual end June 30, when the "M-46" orders under which the distribution and use of materials by the oil and gas industry were regulated during the Korean crisis were re-

JIG-SAW PUZZLE



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WATCHING WASHINGTON

Bertram F. Linz

Exports Picture Brighter

Strict limitations on the amount of oil-country tubular goods that may be exported for foreign operations will be maintained through the third quarter but there are indications they may be relaxed in the final 3 months of the year.

Although third-quarter quotas will be as low as any for previous recent periods and applications for export licenses had to be trimmed as usual, the Office of International Trade has received no protests over its actions in sharp contrast with previous quarters.

Officials attribute the lack of protests to the psychological effect of the termination of domestic material controls and the increasing availability of materials from European sources. The indications, they say, are that companies operating abroad have little fear that any important activities will be slowed down by lack of material.

For the past 3 years the need to spread oil industry materials as widely as possible to expand productivity has been as important to OIT officials as the basic aim of export controls to prevent strategic material from reaching the Communists.

PAD's Activities Cut

The Petroleum Administration for Defense will begin to operate in a sharply curtailed area made possible by the final termination of all restrictions on civilian industry.

Except for difficulties oil companies may encounter in securing material needed for the construction of plants to provide direct military products, PAD will have little to do in the field of materials. The only priorities which will carry over after June 30 are those for military and Atomic Energy Commission programs.

PAD will continue to work with the Armed Services Petroleum Purchasing Agency in developing additional sources of aviation gasoline, and it will keep up-to-date its studies of industry expansion programs and prospective future requirements.

With the approval by the Attorney General of the voluntary agreement under which American oil companies operating abroad may furnish supply - demand information, PAD will continue to receive the reports of the companies.

The agreement also will permit the companies to deal cooperatively with any shortages that develop throughout the world, and PAD would have to supervise such programs if it became necessary to invoke them.

Antitrust Laws Study

The so-called "international oil cartel" case, recently transferred from Washington courts to New York, is to be the basis for an exhaustive study of the extraterritorial application of the antitrust laws by the Department of Justice.

The case is one of a large number of situations which will be reviewed by a committee to be set up by Atty. Gen. Herbert Brownell, Jr., to develop the "middle of the road" policy to be followed in antitrust enforcement.

The cartel case presents the issue whether our antitrust laws apply to business operations abroad on the basis simply that they affect the United States. Also, it raises the question what if American courts are to have jurisdiction over every action in the world that affects us will not every other nation have jurisdiction over our actions which affect it?

It has already been demonstrated that foreign countries have no intention of bowing to American courts. In a case against Imperial Chemical Industries, Ltd., and E. I. du Pont de Nemours & Co., Inc., the rights of a third party in England were affected and the English courts enjoined performance of the American court's order.

Other aims of Brownell's investigation are to develop a better definition of monopoly; decide whether the Robinson-Patman Act should be affirmed, repealed or revised; eliminate duplication of jurisdiction of enforcement agencies; resolve conflicts between the several antitrust statutes; determine the effect of patents and trade-marks on the antitrust laws; study exemptions from the antitrust laws existing or desirable for labor unions, cooperative associations, trade associations, and voluntary agreements under the Defense Production Act.

voked by the National Production Authority.

A new regulation, effective July 1, however, imposed controls on the acquisition of nickel-bearing stainless steel, making it necessary for operators to obtain specific authorization from the Interior Department (through the Petroleum Administration for Defense) before placing priority orders.

The order will be limited purely to orders placed for third-quarter delivery and, as of now, will expire September 30.

The three orders revoked are M-46, providing priorities assistance to the industry in the United States and Canada; M-46A, covering foreign petroleum operations, and M-46B, imposing construction limitations on the domestic industry. They were among the more than 105 regulatory orders issued by the NPA, all but 8 of which now have been revoked.

The latter are designed to support the limited priorities-assistance program for military and atomic-energy programs.

Under the new system PAD will not be a claimant agency for the industry as it was in the past. So far as the industry is concerned, the only program now entitled to priorities assistance will be that for aviation gasoline. When avgas producers encounter difficulties in securing materials they will take the matter up with PAD which will make representations to the Defense Department, the claimant agency for military programs.

WEST COAST

South Cuyama Zone Unitized

LOS ANGELES. — Richfield Oil Corp. last week announced the unitization of the Dibblee zone of South Cuyama field, effective July 1.

Gas repressuring already was under way, the company said, and by the first of this week it was expected that five wells would be injecting a total of about 28,000,000 cu. ft. of gas daily.

The unitization project is expected to recover between 40,000,000 and 80,000,000 bbl. of oil more than would have been obtained by primary recovery means.

Involved are 14 properties covering 4,656 acres, 8 of which are owned by Richfield, 5 by Bell Petroleum Co., and 1 by Monterey Oil Co. The unitized area contains 213 producing wells. Richfield will be operator.

The unitization program has been under negotiation for about 18 months.

EUROPE

Huge Line Contract Let

NATO signs Foster Wheeler to ramrod laying of 1,920-mile products system to supply western European defense force

Dahl M. Duff

FOSTER WHEELER CORP. has signed a contract with the North Atlantic Treaty Organization (NATO) in Paris to handle one of the biggest pipe-line construction jobs ever carried out.

The project involves building a system of lines in western Europe which will supply fuel to more than 100 air bases as well as to ground forces. The lines, ranging from 4 to 10 in. in diameter, will total 1,920 miles.

Cost of the program is estimated at more than $100,000,000, which will be borne jointly by the NATO allies with the U. S. Government paying about 40 per cent. The network is now in the final planning stage. G. P. Jennings, superintendent in charge of products-line operations of Phillips Petroleum Co., is expected to begin work soon as head of the NATO fuel committee. He has been in Paris assisting with the planning.

The pipe-line network involved in the Foster Wheeler contract is expected eventually to be tied into an 8 or 10-in. line which the United States has been planning to build from St. Nazaire on the French Coast to Metz. The French and the United States governments have been negotiating over this proposal for the last 2 years.

Foster Wheeler's French subsidiary, Soc. Foster Wheeler Francaise, signed the contract for the NATO system. Each of the countries will route and carry out the construction of the lines within its own borders, but over-all supervision will be under Foster Wheeler. Work is expected to start later this summer and extend over two construction seasons.

Netherlands to the Alps . . . Available information on the NATO system indicates it will extend from the northern Netherlands to the French-Swiss Alps. The entire NATO program includes building 130 air fields costing more than a billion dollars. The pipe-line system and associated facilities is expected to cost about a tenth of this total sum.

Under the present system, fuel used at the air fields is supplied by available commercial transportation tank car, tank truck, and barge. The NATO program calls for certain centrally located tank farms in western Europe, with buried lines extended from these storage points to individual air bases in forward areas or to secondary storage near a group of fields. Each NATO country now is responsible for fuel supply to its air forces regardless of whether they are stationed in the country itself or some other country. With the pipe-line system, storage and supply will be centralized.

Military experts in Europe say the pipe-line system will give the NATO defense organization far more flexibility than would otherwise be possible. Aircraft could be shifted from one area to another with assurances that necessary fuel will be available. Unofficial estimates are that a wing of 75 jet fighters in combat could consume a half million gallons of jet fuel a week, or about 1,700 bbl. daily. The plans for Europe's defense call for a total of approximately 9,500 aircraft to be available by late 1955.

Aerial Maginot . . . Recent reports from western Europe have spoken of an aerial Maginot line along the French-German border. Late last year, the United States Air Force finished moving all its jet fighter bases in Germany to new positions west of the Rhine River. This move placed the bases far enough back to avoid being knocked out in a surprise attack but still near enough to play their full role.

OVER-ALL PROGRAM of defense pipe lines in western Europe includes a United States line from probably St. Nazaire to Metz.

The separate project of a United States pipe line across France (see map) has been held up, according to reports from Paris, by French-American differences over the division of costs and other considerations. This line is expected to cost about $25,000,000. In peacetime, it is to be managed by a joint French-United States commercial company.

It is now understood that the negotiations over the Metz line are in the concluding stage. The United States has five ground divisions and 20 or more air wings stationed in western Europe, and it is these forces that the line is intended to supply with petroleum fuels. Some reports have indicated it will originate at Bordeaux.

Expansion Permits Granted

Despite an existing surplus of refining capacity, an Italian interministerial commission has granted applications for the expansion of a number of plants.

The refineries, their new authorized capacity, and, in parentheses, the authorized capacity at the end of 1952 follow (metric-ton figures converted to barrels daily on the basis of 1,000,000 tons per 20,000 bbl. daily):

Condor, Rho, 28,000 bbl. daily (20,000 bbl. daily).

Esso, Trieste, 6,000 bbl. daily (3,000 bbl. daily).

Garrone, Genoa, 10,000 bbl. daily (3,000 bbl. daily).

Ilsea, Lecco, 1,800 bbl. daily (1,000 bbl. daily).

Lombardi Petroli, Villasanta (Sardinia), 4,000 bbl. daily (3,200 bbl. daily).

SARPOM, 20,000 bbl. daily (13,000 bbl. daily).

STANIC, Bari, 28,000 bbl. daily (10,000 bbl. daily).

Socony-Vacuum Italiana, 62,000 bbl. daily, (26,000 bbl. daily).

Drilling Firm Organized

Drilling & Exploration Co., Inc., and a Dutch construction firm have organized a contract drilling company which is undertaking work for the Royal Dutch-Shell and Jersey Standard subsidiary in the Netherlands.

The new company is known as Drilvo. The Dutch partner is the Volker Mij. tot het Uitvoeren van Openbare Werken, N.V. (Volker Co. for Carry-

ing Out Public Works). Drilexco, of Dallas, founded by J. E. Brantly, has done contract drilling in Turkey, Brazil, Argentina, and other foreign countries, and is one of the best-known contracting companies in the business.

Drilvo has contracted to drill several tests in Schoonebeek field in Drenthe Province in the eastern Netherlands. The operator, Nederlandse Aardolie Mij., is lending a rig and providing some of the materials and services for the operation.

Drilvo intends to branch out into contract work in other countries of the Eastern Hemisphere later.

AFRICA

Expansion Urged

Government group hits at shortage of oil in Egypt

RECOMMENDATIONS for increased exploration and refinery and pipe-line construction in Egypt have been made by a government group in recognition of the growing gap between domestic production and consumption.

A report on Egypt's future oil policy, prepared by Hussein Fahmy, chairman of the National Production Council, and embodying the recommendations of a technical committee, points out that local consumption is rising by 10 per cent annually and that domestic production still satisfies only 68 per cent of the country's needs.

The report calls for stepped-up exploration in Abu Deria, Hurgada, and Gemsa and recommends that the Wadi Feiran and Ras Matarma fields be produced. It also says that the oil companies should be encouraged to prospect in the western desert and in Egyptian territorial waters north of Sinai.

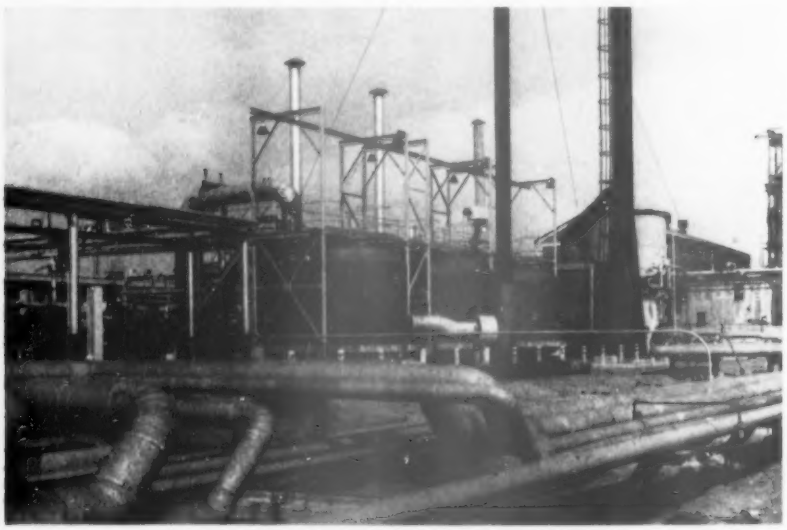
New plants proposed . . . Capacity of the government-owned refinery at Zaiti near Suez should be raised to about 30,000 bbl. daily, and Anglo-Egyptian Oilfields, Ltd., should increase capacity of its Suez plant by 6,000 bbl. daily. The report also recommends that two refineries, to be operated by oil companies, be established, one in Cairo with an annual capacity of 20,000 bbl. daily, and another in Alexandria, both processing imported Middle East crude shipped from the eastern Mediterranean terminals at Banias and Sidon. Also recommended in the report is a 3-year plan for the construction of pipe lines connecting the refineries with storage terminals.

Exploration in Egypt by the two leading operators, Anglo-Egyptian and Socony-Vacuum Co., Inc., came to a complete halt last year as a result of unworkable terms in the 1948 petroleum mining law. The government removed the most objectionable legal feature in a new law in January, but still unsettled are other serious obstacles to new investment, particularly an unsatisfactory method of pricing products on the domestic market.

Durban Project Pushed

The new 25,000-bbl.-daily refinery of Standard-Vacuum Refining Co. of South Africa, (Pty.), Ltd., at Wentworth adjoining Durban is scheduled to go into initial operation next January.

Substantial progress has been made in the construction under Foster Wheeler Corp., the main contractor. Standard-Vacuum now has the first group of operating personnel for the new plant undergoing training overseas. The refinery will be the first in the Union of South Africa, and will be operated by a staff of 300 Europeans, largely South Africans, in addition to the labor force.



Stanlow Unit Boosting Europe's Sulfur Output

An increasing amount of sulfur is being produced as a result of oil-industry operations in western Europe. One of Britain's major sulfur-recovery units is at Shell's Stanlow plant, the Claus kilns of which are shown here. The plant produces 10,000 long tons a year of 99.9 per cent pure sulfur and has a high degree of automatic control. The operation permits extraction of 97 per cent of the sulfur present in the waste refinery gases entering the plant. Approximately half the tonnage from the plant is used by the company in a new sulfuric acid plant which produces enough acid to meet current needs. This and other sulfur-recovery operations in western Europe, including those from hydrogenation and shale oil, are expected to provide a total of about 90,000 tons a year when all projects now planned or under construction are completed.

FAR EAST

Indonesian Issue

Main parties split over seizure of oil properties

THE question of nationalization of the North Sumatra properties of Royal Dutch-Shell, long a political issue in Indonesia, has become a key point of disagreement between the country's two main parties.

The formation of a new cabinet in Indonesia has been blocked by the failure of representatives of the Moslem party and the Nationalist-Communist coalition to agree on the North Sumatra oil question.

The Nationalist party has made nationalization of the properties a part of its platform. While agreeing to nationalization in principle, the Moslem party opposes such action at the present time because of the country's weak economy and the certain adverse reaction abroad.

Royal Dutch-Shell has been denied access to North Sumatra since the end of the war. Prewar it had a production of about 22,000 bbl. daily along with an 18,000 bbl. daily capacity refinery

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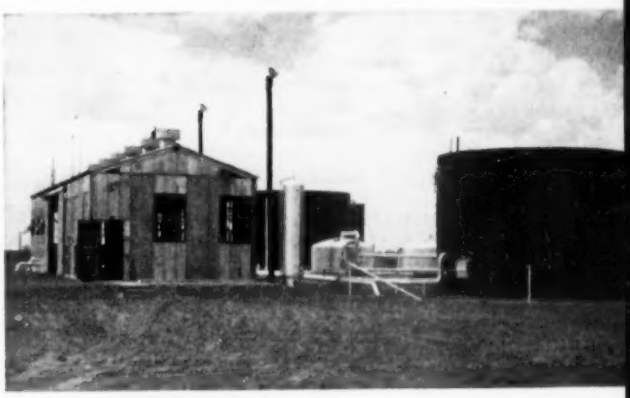

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in this historic oil area where the Royal Dutch company originated in the 1880's.

Small-scale makeshift operations are now carried on in North Sumatra by Indonesians. The facilities are believed to be largely in ruins. The refinery was destroyed by the Dutch in 1942, bombed by the Allies in 1945, and a part of the remaining plant was reportedly burned by extremists in August 1947.

Most of Indonesia's present production of about 200,000 bbl. daily is by Royal Dutch-Shell, Standard-Vacuum, and Caltex in southern and Central Sumatra. A few months ago, Royal Dutch-Shell told the Indonesian Government it was prepared to invest $400,000,000 over the next 10 years in the Indonesian oil industry. In return, it asked three guarantees—a 50-50 profits split with the government, restoration of its legal rights in North Sumatra, and maintenance of law and order in the country.

Assam Testing Discovery

A high percentage of natural gasoline has been found in samples of crude from the Nahorkatiya discovery of Assam Oil Co., Ltd., in the Brahmaputra Valley in northeastern India.

The company currently is assembling equipment for full tests of the well. Plans are to deepen the hole to determine the possibility of production from below 10,000 ft. The well is located in a bend of the Bramaputra River about 21 miles south and west of Digboi.

The recent annual report of the parent Burmah Oil Co., Ltd., commented that it is too early to tell if the indications of production at Nahorkatiya will be of commercial value.

New Refinery Approved

Caltex (Philippines), Inc., has signed a pact with the Philippine Government which grants the company a concession in Bauan, Batangas, to build its proposed 13,000-bbl. refinery.

The plant, which will cost about $30,000,000, is expected to be completed and in operation late next year.

Plans for the new refinery were first made public in June 1951, at which time company officials said the unit would handle Indonesian crude. This would eliminate the present costly necessity for carrying oil from the Middle East to supply the company's markets in the region.

Oil Search Getting Results

Exploratory work is still at a standstill in Burma, but progress has been made in programs in India and Pakistan, according to the recent annual report of Burmah Oil Co., Ltd.

There was considerable improvement in restoring stability in Burma last year, but road and rail transport are still liable to frequent interruption and road travel is dangerous in places close to Chauk oil field.

Drilling at Sui in Baluchistan in West Pakistan indicates a major new natural-gas field. The second well, commenced just before the end of the year, has been successfully completed, and discussions are being held with Pakistan authorities on utilization of the gas.

A test well at Chak Naurang in the Punjab in West Pakistan found oil, but it was of poor quality and in emulsion with water. B.O.C.'s report said it is not possible yet to say if this discovery will be of value.

Negotiations for finalizing the so-called joint venture with the Burmese Government will soon be resumed. Under this plan, the government will acquire a share in the local oil industry. A draft agreement between government and the local oil industry initially was subject only to acceptance by the government of the valuation of $42,000,000 which was placed on the undertaking.

A commission surveyed the assets, and the government accepted the company's valuation. Further progress was then held up while the Supreme Court in Burma passed on the constitutionality of the proposed undertaking. The ruling subsequently made by the court was favorable.

LATIN AMERICA

Monopoly Set Up

Bolivian agency controls oil imports, distribution

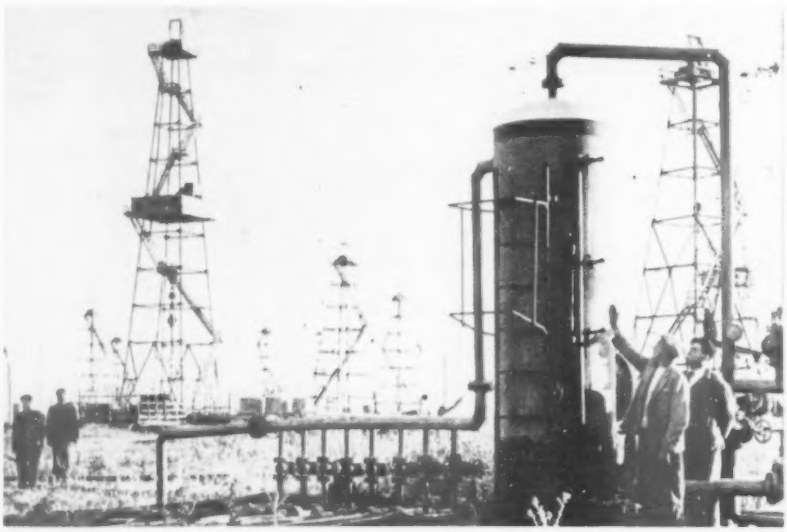
THE Bolivian Government has set up an oil importing and distribution monopoly under the existing state agency, Yacimientos Petroliferos Fiscales Bolivianos.

A Supreme Decree of the government gave Y.P.F.B. exclusive control over imports and internal distribution of crude oil, all grades of gasoline, kerosine, diesel oil, and fuel oil. Existing stocks in possession of commercial companies must be declared monthly until they are consumed.

The decree provided for the cancellation of all import permits not covered by established bank credits. Orders covered by credits must reach Bolivia by July 15. Otherwise the shipments will be delivered to Y.P.F.B.

In the future, an annual exchange allotment will be established by the Central Bank and released on a quarterly basis to allow Y.P.F.B. to meet the import requirements. Imports brought in through certain designated customs ports for exclusive distribution in the northern departments of Beni and Pando were excepted from the decree.

Y.P.F.B. has been the state entity in producing and refining since Bolivia took over the properties of Standard



Russia Aiming at Million-Barrel-Daily Mark

Here is a view of equipment in use in one of the producing fields in the Soviet Union. The picture was supplied by Sovphoto under a caption which identified the area as a part of the Buzovnyneft field in the Azerbaijan Republic. Russia itself is now believed to be producing about 935,000 bbl. daily. The Communist goal calls for an output of nearly 1,400,000 bbl. daily by 1955.

Oil Co. (N. J.) in 1937. Several years ago, Bolivia built about 9,000 bbl. daily in refining capacity with a loan from the United States' Export-Import Bank, but efforts to increase production above the present approximately 1,500 bbl. daily have not been successful.

In November 1950, the former government in Bolivia promulgated a law which provided for limited operations by private foreign capital in certain specified areas. None of the large operators took advantage of the type of deal offered.

McCarthy agreement . . . The only foreigner to be given an oil concession in Bolivia since the Jersey Standard expropriation is Glenn McCarthy, Houston operator, whose agreement was approved in a recent decree. According to reports from La Paz, McCarthy was given assurances against nationalization during the period of the contract.

McCarthy will operate in southern Bolivia across the Bermejo River from Argentina in an area where Jersey Standard was working just before it was ousted from the country. Royalties are on a rising scale of between 16 and 40 per cent of gross production. McCarthy is pledged to spend about $5,000,000 on the program over the next 3 years with between $100,000 and $300,000 posted as earnest money. The concession covers about 500,000 acres in southeastern Bolivia and has a full term of 35 years. Last year, McCarthy obtained a sulfur mining concession in Bolivia's Potosi Department on the Chilean border.

Creole's Production Drops

Creole Petroleum Corp.'s operated production in Venezuela was down slightly in May.

Output averaged 732,511 bbl. daily against 739,415 bbl. daily the previous month. Of the May production, 597,080 bbl. daily was from Lake Maracaibo, 5,947 from other western Venezuelan fields, and 129,484 bbl. daily from eastern Venezuela.

The company refined 144,049 bbl. daily during the month, 63,222 bbl. daily at Caripito and 80,827 bbl. daily at Amuay.

An average of 20.2 rigs were operated during the month. Nine wells were completed, all oil producers. Four of the wells were exploratory. Location, initial production, and total depth of the exploratory wells were: Maracaibo, 756 bbl. daily, 5,513 ft.; Orocual, 898 bbl. daily, 4,178 ft.; Pilon, 80 bbl. daily, 3,658 ft.; and Quiriquire, 176 bbl. daily, 5,251 ft.

Barter Deals Offered

Iran making overtures to Cuba, Italy, and Japan to take oil in payment for sugar and various manufactured goods

MORE and more barter deals are being offered by Iran in an effort to win outlets for its nationalized oil.

The Iranian Government offered to buy 100,000 tons of sugar from Cuba and pay for it with oil. In Havana, Cuban authorities were studying a cabled proposal from the Iranian National Oil Co.

An Iranian official arrived in Rome to continue negotiations with a group of Italian companies on a plan to trade Iranian crude oil for a variety of Italian manufactured goods, including trucks, tractors, machinery, tank cars, and tires. The official, Djahanguir Ahi, said the only barrier to closing the deal was uncertainty over whether the Italian Government would grant licenses for importing the oil.

A Japanese company which had put in a bid for a sugar-refining plant in Iran was notified by the Iranian Government that the contract would have to be switched over to a barter basis with oil in exchange for the equipment.

Inflation inroads . . . Prime Minister Mossadegh's Government in Teheran last week slapped stringent controls on imports and foreign exchange in an effort to curb inflation. The measures reflected the financial problems facing Iran after a 2-year loss of revenue from its once-private oil industry.

The national bank was given a monopoly on all foreign exchange and instructed to issue no import permits under the new regulations until August 23. The Iranian rial has dropped to a rate of 126 to the dollar, a decline of 45 per cent in the last 3 months. The bank will buy and sell exchange at a fixed rate of 100 to the dollar.

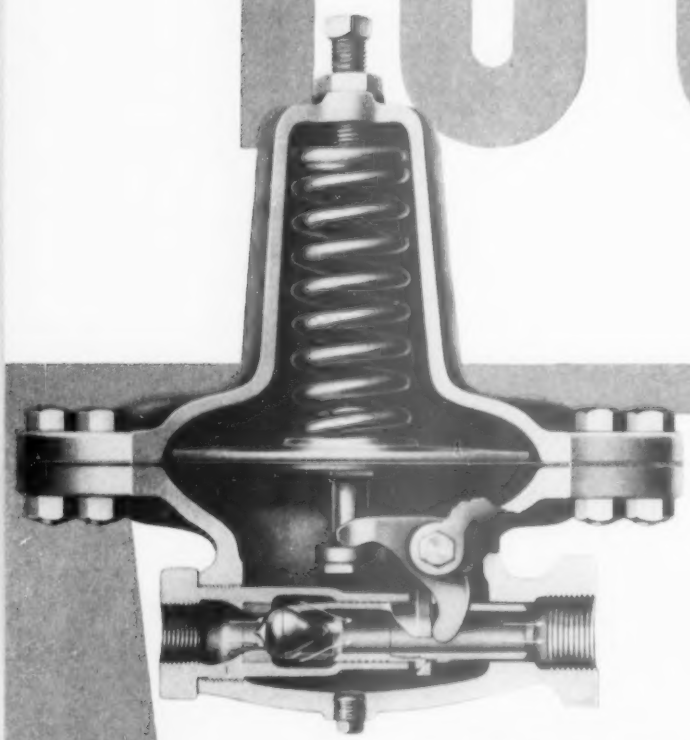
Export summary . . . Anglo-Iranian Oil Co., Ltd., last week distributed a summary showing that thus far eight cargoes of oil have been shipped from Iran since the company was forced to halt its exports in June 1952. The total exported by Iran amounts to 62,095 tons, or about 465,000 bbl. The company pointed out this compares with 54,000,000 tons, or about 405,000,000 bbl. during the immediately preceding 2-year period.

So far, three legal decisions have been given. One of these was at Aden where early this year a court upheld the company's claim to ownership of the oil shipped last summer in the Rose Mary. The other two decisions were at Venice March 11, and at Tokyo May 17. In each case, Anglo-Iranian made application to the appropriate local court for an order that the oil should not be disposed of pending conclusion of legal proceedings to determine ownership. Both applications were refused, but in neither was there a decision on the ownership of the oil which was not the subject of the court's proceedings.

Eight Foreign Nations Represented at Nomads Meet

International guests at the Los Angeles Chapter of Nomads' regular monthly dinner meeting in June were (standing, left to right): B. de Beaumarchais, S. N. Repal, Algiers; Milton H. Hobbs, Standard Vacuum, Sumatra; V. C. Dabbs, Mene Grande Oil Co., Venezuela; Thomas D. Foster, Standard Vacuum, Sumatra; J. C. Bazinet, Arabian American Oil Co., Saudi Arabia; L. Hahn, Wintershall Emsland, Germany; E. C. Mahmoodian, D. & E., Iran; Josip Vuckovic, Naftaplin, Yugoslavia; (sitting) Jim Worsdall, National Supply Co., Venezuela; F. Leca, S. N. Repal, Algiers; R. Samizadeh, D. & E., Iran; Robert S. Hall, Petro-Tech, Venezuela; Bob Grebe, Baker Oil Tools, Venezuela; I. Eklund, Johansson y Cia., Bolivia; H. Haydarpoor, D. & E., Iran.

TYPE 1000 VALVE



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CASH STANDARD **DECATUR, ILLINOIS**

A. W. CASH COMPANY

Refining Executive

But promotion interferes with Lauterbach's hobby

DOWN in the yacht harbor at Wilmington, Calif., is a weather-beaten, 46-ft. power cruiser which almost became the hobby of R. E. Lauterbach, new manager of General Petroleum Corp.'s manufacturing department.

Lauterbach, then manager of the company's yet-to-be-built refinery at Ferndale, Wash., had his heart set on buying the ancient craft. He had elaborate plans for power cruising on Puget Sound, on which the 35,000-bbl. refinery is to be built.

But in May, a few days before Dick planned to close the deal, he received a promotion. J. H. Curtis resigned as manager of manufacturing and Dick Lauterbach was selected to fill the position. His new headquarters thus are in the General Petroleum Building in Los Angeles, instead of at a Puget Sound address.

The recent promotion was his second of the past year. Until last November he was assistant manager of the company's 125,000-bbl. Torrance refinery.

A native of San Diego, Dick grew up loving the ocean. This led him to serve a hitch in the United States Navy after finishing high school. He continued his education, however, graduating from the University of California at Los Angeles in 1936, with a scholastic record high enough to earn him a Phi Beta Kappa key.

He joined General Petroleum upon graduation and has been with the company ever since. After spending 3 years as a laboratory assistant, he became a chemical engineer in the laboratories department, where he remained until 1945. At that time he was assigned to the Torrance plant as a refinery engineer, the post he held until being named assistant manager in 1950.

In addition to membership in Phi Beta Kappa, Dick also is a member of Phi Lambda Upsilon, Sigma Xi Associates, Alpha Chi Sigma, and the American Chemical Society. But up at the Washington refinery site, he's known as the "friendly Phi Bet."

Mark D. White has been appointed superintendent of Skelly Oil Co.'s pipeline department in Kansas. His offices will be in El Dorado, Kans. He has assumed the duties of the late George E. Ault.

William H. Crowe, senior petroleum engineer for Humble Oil & Refining Co. in Tyler, Tex., has been transferred to Gladewater, Tex., as district petroleum engineer.

Charles A. Houston, Stanolind Oil & Gas Co., has been elected chairman of the nomenclature committee of the Mississippi Geological Society. Other members of the committee are: **Dwight H. Bingham, Jr.,** Continental Oil Co.; **Curtis McHorse,** Dixie Geological Service; **H. Leroy Francis, Jr.,** Carter Oil Co.; and **H. M. Morse,** State Oil and Gas Board.

Norval F. Myers, managing director of Esso Petroleum Co., Ltd., London, has been named deputy coordinator of refining activities for Standard Oil Co. (N. J.), New York. He was elected a member of the board of directors of the former Anglo-American Oil Co., Ltd., now Esso Petroleum, in 1950.

Charles W. Bouchillon and **Arnold R. Zubik** have been added to the maintenance department of the engineering division of Humble Oil & Refining Co. at the Baytown, Tex., refinery. **Glenn A. Stankis, Egbert W. Biggers, Jerry G. Jenkins, William N. Lyster, Wayne F. Mardis, Bruce A. Martin, Fred S. McDonald, Paul D. Meek,** are new employes in the technical-service division. **Charles S. Lloyd** has rejoined the technical-service division following a tour of duty with the Air Force.

Tom L. Holland has been appointed drilling superintendent for Crawford Drilling Co. His headquarters will be in Laurel, Miss. He previously served as drilling superintendent for L. D. Cain Drilling Co. and was associated with Houston Oil Field Materials Co.

Raymond M. Hart has resigned as assistant to the president of Carter Oil Co., Tulsa, to become exploration manager of D. D. Feldman Oil Co. in Dallas. He began his career 18 years ago as a surface geologist for Carter and was transferred 2 years go to Mattoon, Ill., as exploration manager for the eastern division. He returned to Tulsa 3 months ago.

M. O. Atkins, driller for Penrod Drilling Co., in Morgan City, La., has been transferred to Baton Rouge as a tool pusher.

Herschel M. Glasgow has been appointed geologist for the Houston district of Houston Natural Gas Production Co., recently formed subsidiary of Houston Natural Gas Corp. He was with Standard Oil Co. of Texas 5 years before joining the company.

Clark S. Teitsworth and **Herbert Willets,** directors of Socony-Vacuum Oil Co., Inc., have been elected vice presidents. Teitsworth is in charge of supply and distribution, and Willets is in charge of domestic marketing.

K. E. Kalen, mechanical engineer in the compressor department of Panhandle Eastern Pipe Line Co. in Kansas City, has been appointed assistant superintendent of compressor stations. He joined the company in 1949 as assistant engineer in the engineering department.

Robert L. Overhuls, formerly a petroleum engineer for Ashland Oil & Refining Co. in Henderson, Ky., has joined Sinclair Research Laboratories, Inc., in Nowata, Okla., in the same capacity.

Harry L. Dedman, a graduate of Texas A. & M. College in petroleum and mechanical engineering, has joined the engineering staff of Ohio Oil Co. in Midland, Tex. Other new Ohio oil employes in Midland are: **D. R. Atteberry,** petroleum-engineering graduate

of the University of Tulsa; **Henry R. Humble,** University of Texas geology graduate; and **William G. Noonan,** who has a geological engineering degree from Texas A. & M.

A. Ludlow Clayden, technical associate in the chemical research and development department of Sun Oil Co., has retired after 31 years with the company. He is an authority on fuels and internal combustion engines.

Robert E. Price has been appointed a process engineer in the Panhandle Oil Corp. refinery in Wichita Falls, Tex. He formerly was process engineer in the East Chicago refinery of Cities Service Oil Co.

W. E. Lumb, district geologist for Northern Natural Gas Co., has been elected president of the North Dakota Geological Society. **John Lapp,** Union Oil Co. of California, has been elected vice president. Other officers are: **A. Masson,** district geologist, Skelly Oil Co., secretary; and **Steve Harris,** Bismarck consulting geologist, treasurer.

Ted A. Ruble, Amarillo, Tex., manager of Continental Oil Black Co., has been appointed manager of the newly formed Continental Blacks, Inc., in Ponca City, Okla. Continental Blacks recently announced plans to build a $2,750,000 plant in Ponca City designed to manufacture 40,000,000 lb. annually of high-abrasion carbon black from oil. Ruble also will continue as manager of Continental Oil Black Co., which operates an oil-black plant at Lake Charles, La.

C. E. Davis, associate deputy petroleum administrator, has resigned from the Petroleum Administration for Defense to return to his position as vice president of Shell Oil Co. in charge of refining. Davis, who served in PAD for 23 months, was immediately appointed by **Douglas McKay,** secretary of the interior, as a consultant to the agency, to be available in the event problems arise in the field of refining. Other changes in the PAD organization included the appointment of **R. Rea Jackson,** former director of the refining and natural-gas division, as assistant deputy administrator in charge of domestic petroleum operations, and the naming of **Paul E. Kuhl,** director of the foreign refining division, as simultaneous head of the refining and natural-gasoline division. Jackson, a member of Socony-Vacuum Oil Co.'s manufacturing committee since September 1950, and Kuhl, assistant general manager of manufacturing for Esso Standard Oil Co. since November 1950, joined PAD last January and are serving without compensation.

New PAD Official Honored

Joseph A. LaFortune, left, vice chairman of the board of Warren Petroleum Corp. and recently named deputy administrator of the Petroleum Administration for Defense, was honored by oil industry leaders at a reception held last week in Tulsa. Shown congratulating LaFortune, from left, are: Hines H. Baker, president, Humble Oil & Refining Co., Houston; James E. Allison, president, Warren Petroleum Corp., Tulsa; George R. Bryant, vice president, The Texas Co., Houston; and D. L. Connelly, chairman of the board of Devonian Co. and vice president of Warren Petroleum Corp., Houston. LaFortune's appointment to the PAD post became effective July 1; he succeeds J. Ed Warren, Midland, Tex., independent, who left Washington, D. C., last week for Norway.

J. Porter Langfitt, senior vice president of Pure Oil Co., has relinquished his responsibilities as supervisor of refining operations. He will continue to direct the activities of Pure's research and development laboratories, the patent and engineering departments, and will assume general administrative responsibilities on a company-wide basis. **P. N. Gammelgard** has been named to the new position of general manager of the refinery division. Gammelgard has been refinery operations manager the past 4 years. Both will continue to have their offices in Chicago.

David P. Hankins, general superintendent of Pure Oil Co.'s Cabin Creek, W. Va., refinery, has been transferred to the Heath refinery near Newark, Ohio, as assistant to the manager. **Harold P. Saunders,** assistant superintendent at Cabin Creek, has been named to replace Hankins. Sanders joined the company 24 years ago as an analytical chemist. **Kenneth P. Gilson,** staff assistant at Cabin Creek for 6 years, has been named assistant general superintendent there.

M. G. ARTHUR

Milan G. Arthur, Union Oil Co. of California, has been elected chairman of the Conservation Committee of California Oil Producers. Other officers elected for the next year include: **Lewis R. Rogers,** Superior Oil Co., first vice chairman; **R. A. Holman,** Amerada Petroleum Corp., second vice chairman; and **Glenn V. Kersten,** Western Gulf Oil Co., secretary.

Paul Bearden has been appointed assistant to the president of Texas Gas Corp. and New Ulm Corp., Houston. He will devote the majority of his time to operations at the Winnie, Tex., plant.

Paul Stefanik, formerly chief engineer of the chemical products group of the lubricating department of Socony-Vacuum Oil Co., Inc., New York, has been transferred to the lubricating and allied products staff of the company's foreign trade department. His new duties include coordination of chemical products activities in Europe. **Warren**

PERSONALS

A. Beman, formerly in charge of chemical development and byproducts activities of the chemical products group, has been named to succeed Stefanik.

Wayne A. Chrisholm has joined the fuels branch staff of the U. S. Geological Survey in Tulsa. He is a graduate of the University of Washington and formerly was employed in geological work by the U. S. Engineers in Portland, Ore.

Horace L. Temple has been appointed an engineer for Felmont Oil Corp. in Owensboro, Ky. He formerly was an engineer for Continental Oil Co. in Lyons, Kans.

Foster J. Schempf, manager of the exploration department of Stanolind Oil & Gas Co., has been elected vice president in charge of exploration. Also elected vice presidents were: **Frank Lindeman, Jr.,** in charge of production; **George V. Myers,** in charge of financial matters; and **V. E. Liles,** administrative. Lindeman formerly was manager of the producing department. Liles has been administrative coordinator, and Myers formerly was manager of the financial departments. All are members of the company's board of directors.

James McNeill, formerly petroleum engineer for Tevis F. Morrow, has opened offices as a consultant in Los Angeles. Prior to joining Morrow, he was manager of drilling and production for Wilshire Oil Co.

A. E. (Roy) Hoffman, superintendent of South Louisiana and Corpus Christi district operations for Sunray Oil Corp. in Lake Charles, La., has been transferred to Midland, Tex., as production superintendent in the North and West Texas district. Other production departments promotions resulting in transfers include: **Keith Lindley,** tristate district superintendent in Lewisville, Ark., transferred to Lake Charles as district superintendent for South Louisiana; **Fred M. McDaniel,** assistant district superintendent in Midland, transferred to Lewisville to replace Lindley; **Carl E. Wilson,** superintendent of the South Texas district, named superintendent in Alice, Tex., of the newly enlarged Gulf Coast district encompassing two areas formerly operated as the Corpus Christi and South Texas districts; **Loyd L. Peek,** Scurry County area field superintendent, transferred from Snyder to Midland as assistant superintendent for the North and West Texas districts.

John G. Staudt, executive vice president of Dowell, Inc., Tulsa, and **William F. Brown,** Mt. Pleasant, Mich.,

J. G. STAUDT

W. F. BROWN

geologist, have been elected to board of directors of Brazos Oil & Gas Co. **Calvin A. Campbell,** Midland, Mich., has retired from the board. Brazos is a subsidiary of Dow Chemical Co., and is engaged in petroleum exploration.

W. P. Hancock, former assistant exploration manager for Imperial Oil, Ltd., in the Peace River area, has been appointed chief geologist for Merrill Petroleums, Ltd., a Canadian firm. He is a graduate of the University of Saskatchewan and joined Imperial in 1941 as a geologist in Saskatchewan.

Don Russell, petroleum engineer in the Hobbs, N. M., substation of the U. S. Geological Survey, has been transferred to Oklahoma City. He succeeds **N. Orvis Frederick,** who has been transferred to Shreveport.

Paul J. Lewis, manager of the Bismarck, N. D., branch of Billings Geological Service, has been appointed senior stratigrapher in charge of logging.

Claude L. Draper, of Wyoming, has been unanimously elected vice chairman of the Federal Power Commission to serve during the remainder of 1953. Draper is the oldest member of the commission in length of service, having been appointed by President Herbert Hoover in 1930. He succeeds former Commissioner Harrington Wimberly, whose term as a member of the FPC expired last month.

DEATHS

Ellwood N. Archibald, 63, drilling superintendent for Socony-Vacuum Oil Co., Inc., in Caracas, Venezuela, was killed in an oil-tank explosion in Caracas June 25. He was a native of Brookfield, Nova Scotia, and came to this country in 1935 from India. He later was employed by General Petroleum Corp. until he joined Socony in 1945.

A. B. Harp, 44, assistant manager of Exploration Drilling Co. in Midland, Tex., was killed June 22 in an automobile accident near Thermopolis, Wyo.

T. D. Wiley, retired oil operator, died June 24 in Wichita Falls, Tex.

John A. Fryer, 64, retired independent oil operator, died June 25 in Tulsa. He joined the old Barnsdall Oil Co. in 1918 as a petroleum engineer in Bartlesville, Okla., and later become manager of the firm's land and lease department when it was moved to Tulsa in 1921. He also served in the same capacity for Globe Oil & Refining Co. in Tulsa before becoming an independent.

Millard T. Kirk, 76, who retired in 1942 as an executive for Phillips Petroleum Co., died in Norman, Okla., recently. He was a native of Kentucky and came to Oklahoma in 1905. He later worked for several independent oil producers in Bartlesville.

Carl Barschig, 51, equipment executive for Southern California Gas Co., died June 22 in Los Angeles.

Charles Henry Schoenfeld, 86, for many years senior member of Schoenfeld-Hunter-Kitch Drilling Co. in Bartlesville, Okla., died June 25 at his home in Harrisonville, Mo. He retired in 1933.

J. T. Richards, 65, retired chief geologist for the Oklahoma City office of Gulf Oil Corp., died June 29 at his home in Orlando, Fla. He retired from Gulf a little more than a year ago after 30 years' service.

John Howell, 72, retired field superintendent for Muskegon Development Co., died in Muskegon, Mich., recently.

Sid T. Childress, 65, Houston, vice president and general manager of Rio Bravo Oil Co., died recently in Houston. He worked as a tool dresser, driller, gang pusher and production foreman for various companies before joining Rio Bravo as a foreman in 1927. He had been vice president and general manager since 1935.

PETROCHEM REPORT

Globe Solves Pressing Air-Pollution Problem With New-Type Sulfur-Recovery Unit

by J. G. Vlcek* and R. A. Graff†

THE Globe Oil & Refining Co. has recently installed a sulfur-recovery unit, designed to recover some 13 tons of sulfur per day, at its Lemont, Ill., refinery. Approximately 20,000 standard cubic feet per hour of acid gas is processed in the unit.

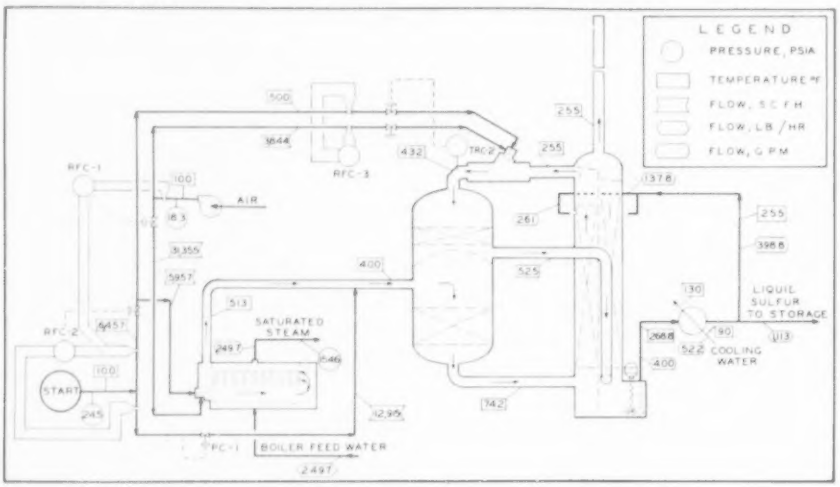
This step was taken as a part of an active program for the elimination of air pollution and to provide an additional source of elemental sulfur which has been in short supply in the Great Lakes area.

The Globe installation is unique, since only three process vessels are required for the two-stage conversion of hydrogen sulfide to elemental sulfur. This arrangement results in a compact plant assembly that is relatively simple to operate and makes possible yields approximately 95 per cent of theoretical.

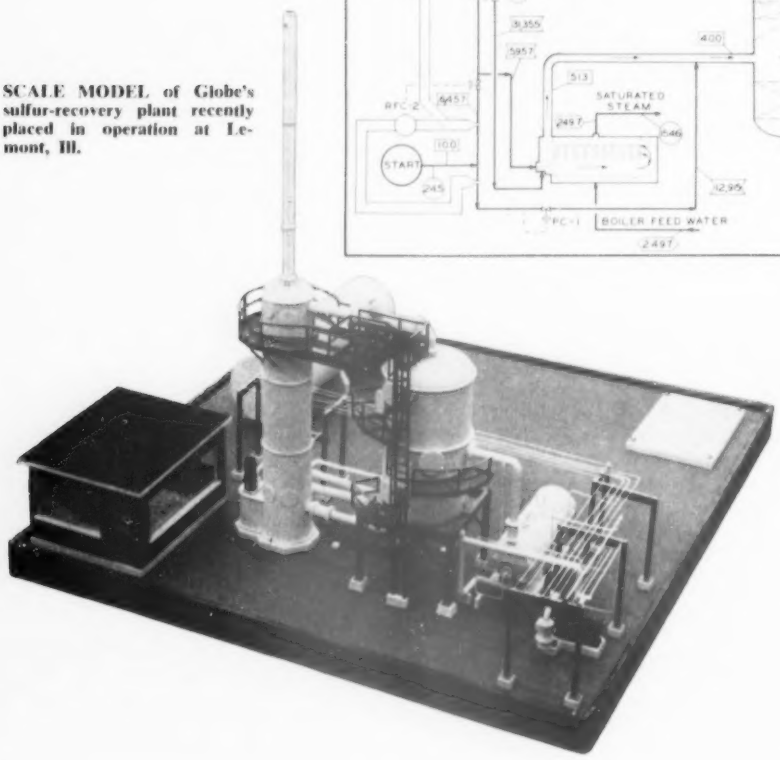
Design basis . . . The Globe sulfur unit is designed for the recovery of 15 tons per day of high-purity sulfur, using a modified Claus process for the conversion of the hydrogen sulfide. A hydrogen sulfide-carbon dioxide gas mixture is available from a refinery-gas amine-type desulfurization unit. Hydrogen sulfide-carbon dioxide gas mixture from the desulfurization unit is divided into two streams, and a one-third portion is burned in the firebox of the steam boiler along with the theoretical quantity of air to produce sulfur dioxide.

The sulfur dioxide, which has been partially cooled in the steam boiler, is then mixed with the remaining two-thirds portion of the acid gas stream from the desulfurization units, and passed to a first-stage catalytic converter, where hydrogen sulfide and sulfur dioxide react to form elemental sulfur and water vapor.

The reacted vapors leaving the base of the first stage of the catalytic converter then pass to the first-stage portion of the sulfur contact cooler, at which point the vapors are desuperheated and the sulfur is condensed. The cooled gas, after sulfur removal, is then reheated by means of a direct-fired, hydrogen sulfide-air burner, to reaction temperature, and passed through a second-stage catalytic converter for final reaction of unconverted hydrogen sulfide and sulfur dioxide.



SCHEMATIC FLOW DIAGRAM of Globe Oil and Refining Co.'s sulfur-recovery unit.



SCALE MODEL of Globe's sulfur-recovery plant recently placed in operation at Lemont, Ill.

*Chief engineer, Globe Oil & Refining Co., Lemont, Ill., and †Graff Engineering Co., Dallas.

The reaction products leaving the second-stage catalytic converter are cooled and condensed in the second-stage section of the sulfur contact cooler, using a recirculating stream of molten sulfur, and the condensed sulfur is pumped to a steam-heated sulfur-storage tank. The waste gases, consisting largely of carbon dioxide, nitrogen, and water vapor are vented to the atmosphere at the top of the sulfur contact condenser.

The nature of the reactions that occur in the process are illustrated by these equations:

$$H_2S + 1\frac{1}{2}O_2 \rightarrow SO_2 + H_2O$$

(in steam boiler) (1)

$$2H_2S + SO_2 \rightarrow 3S + 2H_2O$$

(in catalytic converter) (2)

The design plant material balance is shown under Table 1.

Process Cycle, Fig. 1

Acid gas available from the D.E.A. solution regeneration unit is divided into two streams, and a two-thirds portion of this acid gas flows through the back-pressure valve, PC-1, and an approximate one-third portion flows to the gas burner on the heat-recovery boiler. The one-third acid gas stream is regulated by ratio flow controller RFC-1, and then flows through the diaphragm operated control valve, controlled by ratio flow controller RFC-2, and into the hydrogen sulfide gas burner located in the heat-recovery boiler.

Air under pressure from the blower, and regulated in quantity by means of ratio flow controller RFC-1, also flows to the gas burner, and supplies the theoretical quantity of air required for the combustion of hydrogen sulfide, along with a small quantity of excess air, to insure that oxidizing conditions occur at the heat recovery boiler.

Combustion of the major portion of the one-third acid gas stream mixture takes place in the firebox of the heat-recovery boiler, which has an internal firebox partially lined with insulation and refractory materials to assist in the combustion of the acid-gas mixture with air. The combustion of hydrogen sulfide-carbon dioxide acid gas mixture occurs in the firebox of the boiler under a slight positive pressure, and the products of combustion from the firebox pass through the fire tubes of the heat-recovery boiler and into the piping that connects the heat-recovery boiler to the first-stage catalytic converter.

The temperature of the hot gases leaving the heat-recovery boiler is maintained at a sufficiently high level so that the combined products of combustion of the flue gas stream from the heat-recovery boiler, after mixing with the two-thirds portion of the acid gas mixture passing through PC-1, will result in a mixed gas temperature of approximately 400° F.

In order to control the temperature of the mixed gases entering the first stage of the catalytic converter, adjustable baffles are located in the front breaching of the heat-recovery boiler, and a major portion of the fire tubes may be blanked off, thus diverting more flue gas through the remaining unbaffled tubes, which contain liners to retard the rate of heat transfer between the hot gases and the water in the boiler. The relative position of the adjustable baffles, which is manually controlled, will regulate the temperature of the boiler flue gas, within reasonable limits.

Reactor operation . . . The process gas stream entering the first stage of the catalytic converter consists of the products of combustion from the one-third portion of the acid gas stream plus the remaining two-thirds portion of the acid gas stream in a mixed condition. This gas mixture, containing hydrogen sulfide and sulfur dioxide, along with inert gases, reacts in accordance with the equation:

$$2H_2S + SO_2 \rightarrow 3S + 2H_2O$$

The hydrogen sulfide-sulfur dioxide mixture passes down through the catalyst bed, which consists of a high-iron-content natural aluminum oxide catalyst, and as the reaction occurs, the temperature of the gas mixture passing through the catalytic converter rises, and elemental sulfur is formed in the vapor state. The resultant mixture of sulfur vapor, nitrogen, water vapor, carbon dioxide, and small amounts of unreacted hydrogen sulfide and sulfur dioxide enters the first-stage section of the condenser-scrubber at the base and contacts a recirculating stream of liquid sulfur which condenses the sulfur from the reaction gas mixture.

The temperature of the effluent gas from the first-stage catalytic converter is always maintained at at least 50° F. above the dew-point temperature of the sulfur at the vapor to prevent the formation of sulfur on the catalyst, which condition would increase the pressure loss to the catalyst, and slowly reduce the catalyst activity, necessitating periodic regeneration by operating at higher temperatures for short periods.

Sulfur cooling . . . The residue gas leaving the top of the first-stage portion of the sulfur condenser is reheated by means of a direct-fired hydrogen sulfide-air burner, and then passes into the second-stage portion of the catalytic converter for final conversion. The vapors leaving the second-stage portion of the catalytic converter are then contacted with a liquid sulfur recirculating stream in the second-stage section of the sulfur condenser, in order to remove the sulfur formed. The byproduct vent gas, consisting largely of nitrogen, water vapor, carbon dioxide, and traces of hydrogen sulfide and sulfur dioxide, is discharged to the atmosphere at the vent stack located on the top of the sulfur condenser-scrubber.

Liquid sulfur is circulated over the two sections of the sulfur condenser-contact cooler at a rate sufficient to condense the sulfur present, and cool the vent gas to approximately 255° F. A submerged suction sulfur pump is utilized for this service, and liquid sulfur is pumped from the base of the sulfur condenser, through a water-cooled tube-and-shell-type sulfur cooler, and is returned to the two top sections of the sulfur scrubber-cooler.

(Continued on page 98)

TABLE 1—DESIGN MATERIAL BALANCE FOR SULFUR-RECOVERY UNIT

Component	Feed gas to sulfur recovery unit, S.C.F.H.	Mol %	Air to sulfur-recovery unit, S.C.F.H.	Mol %	Flue gas from heat-recovery boiler, S.C.F.H.	Mol %	Vent gases to atmosphere, S.C.F.H.	Mol %	Sulfur to storage (lb. per hr.)
H_2S	13,917	71.84					486	1.01	
CO_2	4,333	22.37			1,447	4.09	4,457	9.30	
CH_4 +	372	1.92					248	0.51	
H_2O	750	3.87	880	2.50	5,522	15.60	15,379	32.09	
O_2			7,207	20.48		nil		nil	
N_2			27,112	77.02	24,151	68.22	27,112	56.57	
SO_2					4,280	12.09	243	0.51	
S_2							4	0.01	1,113
Total	19,372	100.00	35,199	100.00	35,400	100.00	47,929	100.00	1,113

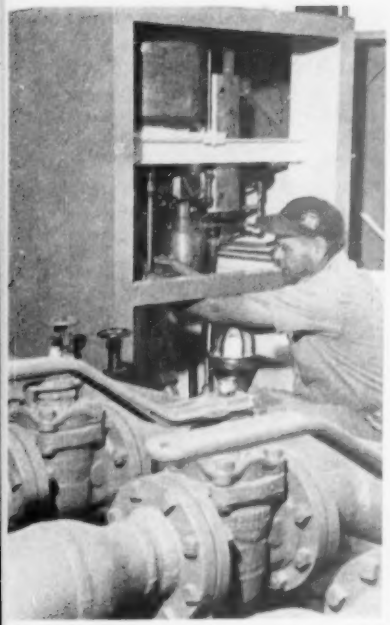


Fig. 1 — Installation of equipment used for tracer injection.

Fig. 2—Injecting tracer solution by use of controls outside shielded cabinet at Salt Lake City station.

Fig. 3—Geiger tubes mounted on pipe to detect passage of the interface marked with radioactive tracer.

How Radioactive Control Is Applied

. . . to a products pipe line

by D. E. Hull* and B. A. Fries*

Radioactive control of products pipe-line operation is a method new to pipe-line technology. Salt Lake Pipe Line Co., however, now has a 2-year backlog of experience in this operation in its Salt Lake City-to-Pasco products pipe line. The use of radiotracers for marking interfaces and for measuring intermixing of products in the line has proved so successful that the newly constructed parallel line from Salt Lake City to Boise has been similarly equipped.

IN the transport of a number of different petroleum products through a common pipe line, it is necessary to distinguish among them for segregation at terminals or take off points. The more accurately the interface can be located, the lower the contamination of one product by another and the smaller the "slop cuts" which must be stored and rerefined. Product specifications may be very rigid. Small amounts of regular and premium-grade gasolines may be intermixed without seriously affecting specifications. However, no measurable gasoline contamination is allowed in diesel oil, and stove oil must be kept out of gasoline. Minimizing these contaminations by more accurate product segregation results in more economical operation of the line.

* California Research Corp.

Identifying interfaces . . . A number of methods for identifying interfaces are now in use; the most common include density measurements by gravitometer and color observations with colorimeters. Neither of these methods will work in all cases and they entail either withdrawal of samples or bypassing a portion of the flow, with subsequent time delay. None of the common methods appeared suitable for use in the Salt Lake products pipe line because of the rather complicated contamination problems. First, there are many different products from several producers transported through the line, including several grades of gasoline, diesel oil, and stove oil. Second, there are seven takeoff points and a terminal at which the products must be identified and distributed. Only relatively small amounts of an individual product are taken off at any one point. Finally, the line is over 560 miles long and passes over terrain varying in altitude from 500 to 5,000 ft.

Radiotracer Method

Accordingly, a new approach to the method of identifying interfaces in pipe lines was undertaken. A method was required which would be independent of the physical properties of the products, and which would signal the location of the interface and indicate the extent to which adjacent products had commingled with each other. A radioactive tracer which can be detected instantly through the walls of the pipe could best satisfy these requirements.

The radiotracer method is free from time lag and is independent of the nature of the products. Measurements of

the radioactivity provide a more precise indication of intermixing. All measurements are made automatically by radioactivity detecting and recording instruments. Based upon the information so obtained, the pipe-line operator may make the necessary withdrawal or diversion of product.

The development of this radioactive method for Salt Lake Pipe Line Co. was carried out in a cooperative program between California Research Corp. and the engineering department of Standard Oil Co. of California. A series of experimental tests was carried out in pipe lines of increasing length. The first test was performed in a 5-mile line, the second in a 24 mile line, while a series of full-scale tests was made on the 182-mile crude pipe line from Rangely, Colo., to Salt Lake City. Following these successful tests, the method was placed in permanent operation on the Salt Lake City-Pasco line.

Preparation of Radioactive Tracer

A radioactive tracer suitable for use must meet several requirements. First, it must emit strong gamma rays which can penetrate the walls of the pipe. Second, its half-life must be long enough to enable its detection after many days in the pipe line, but the half-life should also be short enough to be self-destroying in a reasonably short time. Last, it must be capable of preparation into a stable, oil-soluble, water-insoluble compound.

Antimony-124 . . . Material which meets these specifications to an unusual degree is an oil soluble preparation of antimony-124. This isotope has a half-life of 60 days and emits both beta and gamma rays. The tracer compound is conveniently prepared without resort to elaborate, remote control chemical synthesis by direct irradiation of the compound in the Oak Ridge pile. The naturally occurring antimony isotope of mass 123 captures a neutron to form antimony-124.

Handling the isotope . . . The irradiated compound, which is received in Richmond, Calif., in a lead-shielded shipping container from Oak Ridge, is transferred to lead-shielded equipment in a "hot laboratory." The prepared solution is transferred to a 1-qt. stainless-steel flask which is placed in a heavy cast-steel shipping container serving both as carrying case and shield. Shipment is made to Salt Lake City by a commercial truck line. At the Salt Lake pump station, the flask is opened by special equipment, which includes a shield to protect the operator. The contents are transferred to a permanent storage flask behind heavy lead shielding.

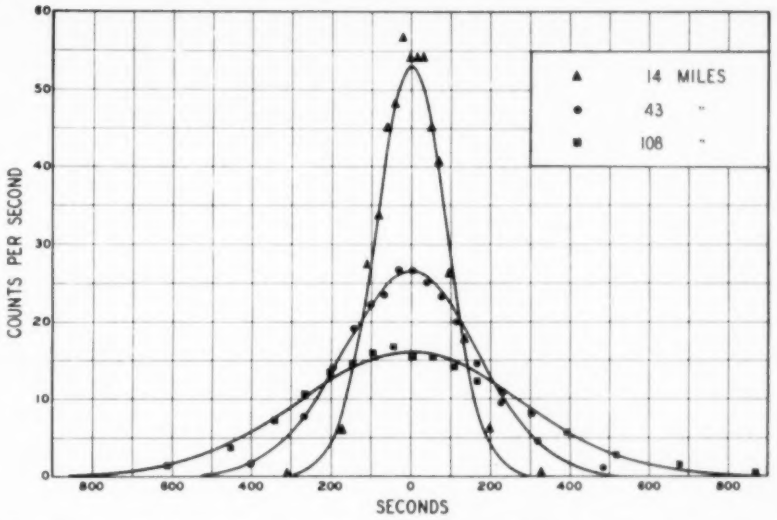


Fig. 4—Spreading of tracer wave during passage through pipe line, compared with theoretical curves at three stations.

The injection system has been designed to permit completely safe handling of the radioactive solution. All operations are by remote control, with valve handwheels extending outside the shielding. This is the only location on the pipe line where radiation levels are high enough to require precautionary measures. However, the injection equipment is well shielded and the operators wear indicating pocket dosimeters to check their radiation exposure. Once in the pipe line the radiation level is less than that shown by a radium watch dial.

The amount of radioactive tracer employed is adjusted to the particular interface to be marked. When an injection of tracer is to be made at a products interface, a small volume of solution, containing sufficient radioactivity, is run into a measuring pipette. This is observed in a mirror by the operator. The measured liquid is dropped into a small blow case, then it is injected into the pipe line by air pressure just before the suction intake of the main line pumps.

Detection . . . The radiation detection equipment at various takeoff points and at the terminus of the line consists of a bundle of gamma ray-sensitive Geiger-Mueller tubes which are strapped to the pipe. The output of these Geiger tubes is fed into a counting rate meter which is connected to an appropriate recorder. The Geiger tubes and rate meter are continuously observing a "background" count rate due to cosmic rays and natural radioactivity in the ground. This background count may be suppressed in the recording instruments so that a record is made only of the additional radiation observed when

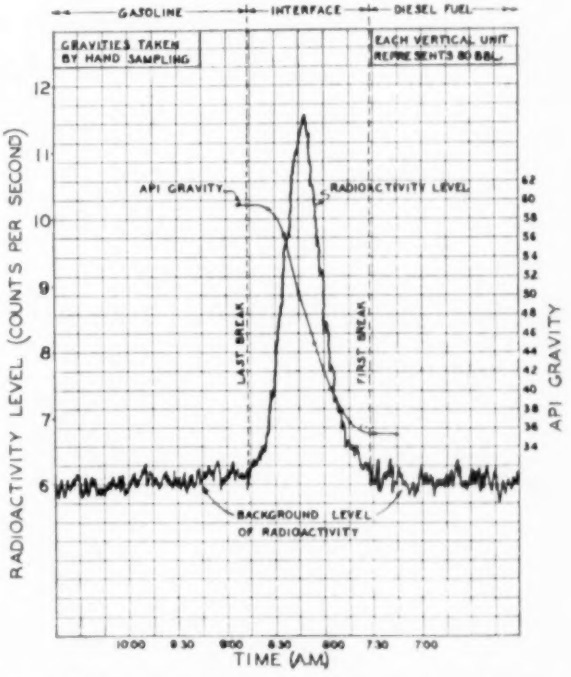


Fig. 5—Radioactive interface recorded automatically on chart, compared with plot hand sample gravities taken concurrently.

the interface passes the counters.

Mechanism of mixing . . . Based upon the experimental tests carried out in the shorter pipe lines and particularly in the Rangely-Salt Lake line, certain observations were made which gave an understanding of the mechanism of mixing and which were useful in selecting operating procedures for the Salt Lake-Pasco line. When the radioactive tracer is first injected at the interface between two liquids, the counters show its passage as a wave of high intensity but of short duration. The tracer diffuses with the commingling products as the interface develops in volume in its passage through the line, and the counters record a broader wave of smaller amplitude.

Probability curve . . . The shape of the radioactive wave can be expressed mathematically and, in fact, has been found to fit the normal probability curve. The peak height of the tracer wave, which is a function of the amount of tracer injected, is observed to decrease approximately as the square root of the distance traveled, while the width of the wave, which is a measure of the volume of intermixing, is observed also to increase approximately as the square root of the distance. The total number of counts recorded at any station is constant under standardized conditions of flow and measurement.

The radioactivity, and hence the concentration of tracer at any point in a developed interface, is a measure of the amount of product intermixture at that point. Therefore, the amount of mixing of one component into the other can be determined at any point and breaks between tenders can be made with any desired limit of contamination.

These observations can be interpreted on the basis of turbulent flow within the pipe line. Under normal conditions of turbulent flow the interface spreads symmetrically in both directions. Under conditions of viscous flow, as found with reduced pumping speed, the interface is extended on the trailing side and the shape and concentration relationships are different.

"Breaks" . . . In operation, as the leading edge of an interface arrives at a station, the radiation level begins to rise. This level reaches a peak when the center of the interface or point of greatest commingling between products is passing. Then the level subsides as the interface has passed. Thus, it is easy for an operator to determine the "first break" or point where commingling begins, the "peak" or point of equal product mixture and the "last break" where the interface ends and a pure product is flowing in the line.

At intermediate stations where only "heart cuts" are made from the line, the tracer is used to indicate the passage of the interface and to permit the operator to withdraw only pure product between interfaces.

Products switch . . . At the terminus of the line and at two intermediate stations, the operator must switch products at the interfaces. At these stations, the operation has been simplified by installing a rate meter several miles upstream. The output of this meter is telemetered to the adjacent delivery station where it is recorded. The operator now has an advance picture of the approaching interface and a knowledge of the peak counting rate corresponding to the center of the interface. With this information, he can cut the product at some predetermined percentage of the peak counting rate corresponding to the allowable degree of contamination of products. That portion of the interface which involves extensive intermixing of products is diverted as a slop cut. With the radioactive marking the loss of products in the slop cut is minimized.

Following an injection at Salt Lake City, the interface (including 98 per cent of the mixed products) at Ogden, 35 miles away, shows a width of about 15 minutes on the chart and represents an interface volume of approximately 100 bbl. At Boise after 328 miles the interface takes 45 minutes to pass and amounts to 300 bbl. At the Pasco terminal 566 miles from Salt Lake City, the interface volume has enlarged to 400 bbl. and requires about an hour to pass.

Automatic boosters . . . Some automatic operation on the pipe line has been incorporated with radioactive control. Two automatic booster pump stations are in operation. These stations are normally started and stopped by line flow. In order to keep the same products in the pumps and manifolding as in the line while the pumps are shut down, a system has been installed for automatically starting the pumps while each interface is passing the station. Geiger tubes are located on the pipe about a mile upstream from these automatic stations and the signal from these tubes which is telemetered to the station starts the pumps. The pumps operate for a preset time interval until the interface has passed and then automatically shut down.

In comparing the radioactive method with the measurement of specific gravity by hand samples, it is found that (1) the first break in radioactivity and the first break in gravity occur nearly simultaneously; (2) the peak in the radioactivity corresponds closely to the midpoint of the gravities; and (3) the last break in radioactivity coincides with the leveling off of the gravity curve. In actual practice, however, when the contaminated interface at Pasco was segregated by hand-samplied gravity measurements about 500 bbl. of contaminated products in each shipment had to be diverted for rerefining. With the use of the tracer this waste volume has been reduced by one-third, effecting a savings of some hundreds of barrels per day of valuable products.

In addition, station operators do not lose time on "standby" waiting to catch the passage of an interface with a gravitometer. The pipe-line dispatchers also benefit from the constant check on the exact width and location of each interface in the line. This has greatly simplified the control of movement of many small tenders to numerous take-off points on this long pipe line.

Radiological Safety

Aside from the laboratory where the tracer is prepared and the injection station at Salt Lake City, both of which are adequately designed for radiation protection, no other radiological precautions are required. Once injected into the pipe line, the tracer is greatly diluted, so that no further hazard is associated with the passage of the tracer wave. In the storage tanks at the terminal, where the interface is diverted, there is further dilution. In fact, total body immersion in the oil would result in less exposure than that due to cosmic rays. Finally, the radiation level decreases constantly as a result of radioactive decay. The radiation problems associated with interface marking in the products pipe line have been successfully handled.

Maintenance and Reliability

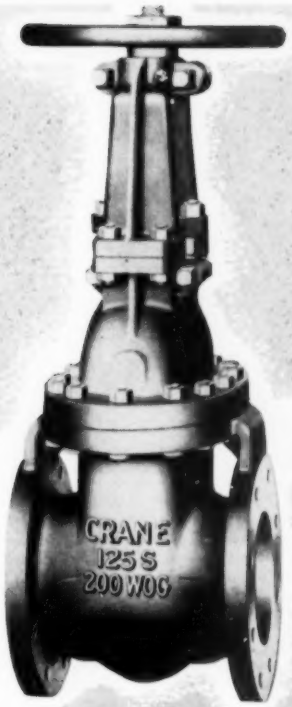
No unusual maintenance features have been encountered in this radioactive installation. There are no mechanical systems to break down and no radioactive contamination problems have arisen. Only the normal maintenance that is associated with such electronic equipment as rate meters and recorders has been required. From time to time, Geiger tubes must be replaced but they are easily removed from their watertight mountings for replacement.

Reference Articles

1. Radioactivity in Pipe Line Flow Studies, D. E. Hull, J. W. Kent and R. D. Lee, World Oil, 129, 187 (May 1949.)

2. Atomic Energy in Industry, Special Conference, October 16, 17, 1952, National Industrial Conference Board, Inc., New York, N. Y.

3. Radioactive Tracers to Mark Interfaces and Measure Intermixing in Pipelines, Donald E. Hull and James W. Kent, Industrial and Engineering Chemistry, 44, 2745 (November 1952.)



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HERE ARE THREE WAYS TO . . .

Use Punched-Card Equipment . . .

by Paul Knaplund* Paul Fullerton,* and Eileen Ford*

AUTOMATIC punched-card equipment, which has been used extensively by petroleum engineers for calculations of reservoir flow, natural depletion, gas injection, vapor-liquid equilibrium, and similar studies involving lengthy mathematical analyses, are now being applied to data-reduction calculations encountered in the exploration for oil. While this type of computation frequently involves a relatively small number of arithmetic operations for each data point, vast quantities of data may have to be analyzed. In this work the use of punched-card equipment may produce greater accuracy, economy, and speed.

In the reduction of magnetic field data the manual reentry of numbers is eliminated. A graphical procedure is replaced by a numerical one in the analysis of seismic data. In radio-positioning calculations a series of tedious formula evaluations is taken over by machine. The details of these three calculations are presented here, not to suggest analytical methods, but to indicate the application of punched-card equipment to specific problems of general interest.

Problem 1: Reduction of Magnetic-Field Data

THE calculation of the second vertical derivative of magnetic intensity using three rings on a rectangular grid illustrates one way in which punched-card equipment may be used in this and similar data-reduction calculations.

*International Business Machines Corp., at Dallas, Tulsa, and Houston, respectively. For a special issue, with nine other articles on business-machine application in the petroleum industry, see The Oil and Gas Journal, February 2, 1953, beginning on page 57.

The choice of a rectangular grid for this demonstration is arbitrary; the procedure may be adapted readily for a trigonal grid. Similarly, the number of rings and the weighting factors used in the calculation of the derivative may be chosen at will, although the number of rings selected will affect the cost and time of calculation to some extent.

In the procedure illustrated, each intensity value is read at an intersection point of a rectangular grid superimposed upon a contour map. The grid lines are numbered to establish an X-Y coordinate system. A card is then punched for each field value read, containing the X and Y position and the intensity reading. To eliminate punching errors, each card is verified against the original data on a card-verifying machine. Following verification, each card is ready for automatic processing.

For a given field value, say $F_{3,4}$, where 3 indicates the X-position and 4 the Y-position, the following neighboring values are needed in the calculation:

Ring 1 (radius 1): $F_{2,4}$; $F_{4,4}$; $F_{3,3}$; $F_{3,5}$

Ring 2 [radius $(2)^{1/2}$]: $F_{2,3}$; $F_{4,3}$; $F_{2,5}$; $F_{4,5}$

Ring 3 (radius 2): $F_{1,4}$; $F_{5,4}$; $F_{3,2}$; $F_{3,6}$

Each field value is automatically associated with those surrounding it in the following manner. Cards are sorted by Y within X. Each intensity value is then gang-punched into the two cards following it and, in a separate operation, the two cards preceding it.

Following these operations the cards are sorted into sequence on Y. The five values now associated with each point are gang-punched into the two

RESULTS OF SEISMIC CALCULATIONS

SHOT POINT NUMBER 3 — VELOCITY (V_o) 2000 ft/sec

DIRECTION SOUTH / NORTH — VELOCITY (V_e) 8500 ft/sec

DATE FEBRUARY 2 1953 — VELOCITY (V_o) 11000 ft/sec

GEOPHONE NUMBER	DISTANCE	ELEVATION	REFLECTED TIME t_r	ELEVATION TIME t_e	WEATHERING TIME t_w	DEPTH OF WEATHERING ZONE h_w	TOTAL TIME TO DATUM PLANE	DEPTH TO REFLECTING HORIZON
1	-880 FT	1084 FT	.813	.006	.010	32	.016 SEC	
2	-770 FT	1081 FT	.802	.009	.006	32	.015 SEC	
3	-660 FT	1079 FT	.798	.004	.010	26	.014 SEC	
4	-550 FT	1082 FT	.789	.004	.010	30	.014 SEC	
5	-440 FT	1079 FT	.783	.009	.010	32	.019 SEC	
6	-330 FT	1076 FT	.781	.009	.007	30	.016 SEC	
7	-220 FT	1074 FT	.770	.008	.008	26	.016 SEC	
8	-110 FT	1073 FT	.760	.003	.009	28	.012 SEC	
9	110 FT	1074 FT	.749	.003	.010	30	.013 SEC	
10	220 FT	1076 FT	.745	.005	.010	29	.012 SEC	
11	330 FT	1079 FT	.738	.004	.009	28	.010 SEC	
12	440 FT	1082 FT	.729	.004	.009	28	.008 SEC	
13	550 FT	1082 FT	.725	.004	.008	25	.011 SEC	
14	660 FT	1084 FT	.722	.005	.010	29	.012 SEC	
15	770 FT	1081 FT	.713	.004	.009	28	.010 SEC	
16	880 FT	1084 FT	.711	.004	.007	30	.011 SEC	
COS A	COS B	COS C	DA	DB	DC			
.5995	.534	.803	2450 FT	2120 FT	3240 FT		2480 FT	

RESULTS OF SEISMIC CALCULATIONS are tabulated from punched cards on this form. Data for one reflecting horizon are key-punched; if several reflecting horizons are being analyzed for a single shot, data are automatically duplicated into the cards.

. . . to Speed Your Oil Exploration

cards following. The deck is reproduced and the values for each point are gang-punched into the preceding two cards of the reproduced deck.

The sorting, reproducing, and gang-punching operations result in each original datum point being represented by two cards, together containing all necessary neighboring values for the second derivative calculation. The cards may now be processed by an automatic calculator, either electronic as the I.B.M. Type 604 or electromechanical as the I.B.M. Type 602-A. Repeated card passes complete the summing and application of weighting factors. A final result, the second vertical derivative of intensity, is punched for each data point. The location of this result is identified by the X and Y coordinates of the original intensity reading.

The result cards may be sorted into any desired order on X and Y prior to their automatic listing on a high-speed printer. Thus the results are produced in the most convenient sequence for mapping.

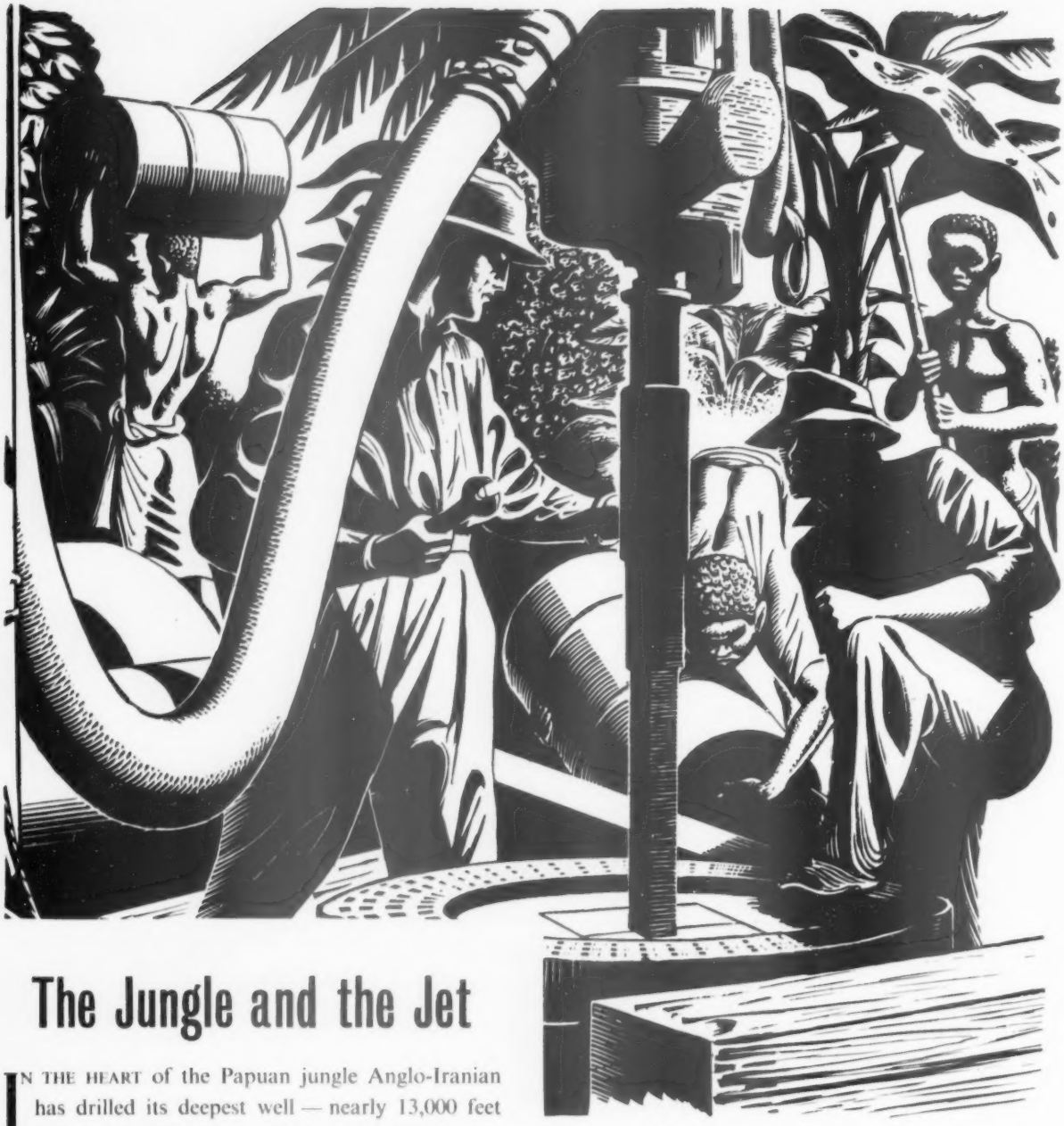
The speed and accuracy of the punched-card method for the reduction of magnetic-field data are due largely to the single manual entry, by use of a card punch, of each intensity reading regardless of the number of computations in which that reading may be used. In the calculation illustrated, each value is used 13 times, although originally punched in only one card. The speed and versatility of the calculating equipment allow the geophysicist to experiment with different formulas and weighting factors without a large investment of either time or money. With the availability of the more powerful I.B.M. Type 700 series of data-processing equipment, further advances in the automatic treatment of very large fields may be expected.

Problem 2: Calculating Reflecting-Horizon Dip

THIS calculation, which is only a part of a complete machine procedure, illustrates one manner in which a numerical solution may replace a graphical one. The computation shown is for a single reflecting horizon using a split spread. Previous machine calculations determine the weathering time, elevation time, and thus the total time to the datum plane for each of 16 geophones in the spread and 8 in the cross-spread.

From the galvanometer record, a reflected time is read for each of the 24 geophones for a given reflecting horizon. A card is punched for each of these readings, containing shot-point number, geophone number, distance of geophone from shot, elevation of geophone, and reflected time. The time corrections for weathering zone and elevation may be key-punched or, if several reflecting horizons are being analyzed for a single shot, automatically duplicated into the cards. If more than one reflecting horizon is being treated, an identification of the horizon should be entered into the card also. The average velocity below the datum plane is also duplicated into each card. All information punched in the cards is verified. The corrected time to datum plane is easily calculated by differencing observed time and corrections to datum plane. This is automatically punched into each card.

The slope of the reflecting horizon in the vertical plane of the spread may now be computed by fitting the best possible straight line through the points which would result from plotting corrected time against distance from shot for each of the geophones in the spread. The line determined by machine calculation minimizes the sum of the squares of the distances of these 16 points from that line. The formula used to compute the slope is:



The Jungle and the Jet

IN THE HEART of the Papuan jungle Anglo-Iranian has drilled its deepest well — nearly 13,000 feet of it! In Sicily, East Africa and England, too, the search for oil goes on. Anglo-Iranian is finding the oil and refining it — turning it to use in a hundred ways, from fuel for jets to fruit tree sprays.

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LISTING OF BOAT POSITIONS IN LAMBERT COORDINATES

BOAT NUMBER	DATE	RED DIAL READING	GREEN DIAL READING	X_p POSITION IN LAMBERT COORDINATES	Y_p POSITION IN LAMBERT COORDINATES
1 A	MARCH 13 1953	58.87	780.97	2,340,000	162,000
1 B	MARCH 13 1953	59.40	779.88	2,340,000	160,000
1 C	MARCH 13 1953	59.94	778.79	2,340,000	159,000
1 D	MARCH 13 1953	60.47	777.71	2,340,000	157,000
1 E	MARCH 14 1953	64.84	769.06	2,340,000	145,000
1 F	MARCH 14 1953	44.57	816.37	2,340,000	142,500
1 G	MARCH 14 1953	47.39	810.00	2,340,000	133,500
1 H	MARCH 14 1953	35.56	831.56	2,360,000	181,500
2 I	MARCH 14 1953	37.00	830.47	2,360,000	180,000
2 J	MARCH 14 1953	37.43	829.38	2,360,000	178,000
2 K	MARCH 14 1953	37.87	828.29	2,360,000	177,000
2 L	MARCH 14 1953	41.01	821.71	2,360,000	168,000
2 M	MARCH 14 1953	41.47	820.61	2,360,000	166,500
2 N	MARCH 14 1953	41.93	819.51	2,360,000	165,000

LISTING OF BOAT POSITIONS may also be done on punched cards.

$$\text{Slope} = \frac{N \sum_{1}^{N} t_{oi}\, d_i - \sum_{1}^{N} t_{oi} \sum_{1}^{N} d_i}{N \sum_{1}^{N} d_i^{\,2} - \left(\sum_{1}^{N} d_i\right)^2}$$

where t_{oi} is corrected time for i^{th} geophone; d_i is distance of i^{th} geophone from shot point, and N is the number of geophones (16 for spread, 8 for cross-spread). In the split-spread illustrated the shot is placed in the center of the spread and cross-spread so that:

$$\sum_{1}^{N} d_i = 0$$

thus simplifying the above formula to:

$$\text{Slope} = \frac{\sum_{1}^{N} t_{oi}\, d_i}{\sum_{1}^{N} d_i^{\,2}}$$

The cosine of A, the angle of emergence in the vertical plane of the spread, is given by:

$$\cos A = \text{Slope} \times V_s$$

where V_s is average velocity below datum plane.

Similarly cos B, where B is the angle of emergence in the plane of the cross-spread, is calculated from the corrected times and distances for the eight geophones in the cross-spread. The cosine of the angle of emergence, cos C, is given by:

$$\cos C = (\cos^2 A + \cos^2 B)^{1/2}$$

since the spread and cross-spread intersect at 90°.

The calculation of cos A, cos B, and cos C may be accomplished in a single pass of the cards through an automatic calculating punch. Suppose that several similar calculations are to be carried out at once. The complete set of cards is sorted so that for each reflecting horizon the 16 cards for the spread precede the 8 for the cross-spread. A result card, or trailer card, is automatically merged behind the last card for the cross-spread for each deck of 24 cards by a card-collating machine. The cards are then placed in a calculator.

Since the electronic calculator processes cards at the rate of 100 per minute, the calculation for each reflecting horizon requires only 15 seconds, with cos A, cos B, and cos C being punched in the result card. At the same time, identifying information such as shot-point number, together with V_s, the average velocity below the datum plane, are punched into the result card.

The result cards may then be separated out of the deck by using a card-sorting machine. Further calculations are then performed to determine the position and depth of the depth point. Final listings of results are produced in a sequence suited to plotting.

By using the mathematical fit of a line through a series of points, this punched-card method eliminates the necessity of plotting corrected time against distance in determining the dip of a reflecting horizon. The error of estimate or "deviation" may be numerically determined to indicate those cases where other treatment of the data should be considered. For instance one could use the deviation as a guide for selection of the points to be used in the calculation. This numerical treatment allows the dip computation to be handled as a single step in the automatic processing of seismic data by punched cards.

Problem 3: Radio Positioning Problem

PUNCHED-CARD equipment may be used in radio-positioning calculations either in the conversion of Lambert coordinate positions to radio-positioning dial readings or for the reverse calculation going from dial readings to Lambert coordinates. In the demonstration calculation, the radio-positioning dial readings are the end results.

In this calculation the data consist of a set of number pairs (X_p, Y_p) describing the positions at which seismic soundings are to be taken. One card is punched for each of these positions. The resulting card contains X_p and Y_p, the Lambert coordinates of the desired position, together with boat number, month and day which are duplicated into the card at the time of punching. The following information is constant throughout the series of calculations:

X_r, Y_r, X_m, Y_m, X_g Y_g coordinates of the transmitting stations

K_r, K_g, C_r, C_g constants for the system

Knowing the constants of the system, which are punched and entered into the calculator on cards with distinguishing punching to identify them to the machine, and X_p, Y_p for each case, it is possible in one method to calculate the corresponding dial readings (L_g, L_r) by the following formulas:

$$L_g = K_g + C_g\,[([X_m - X_p]^2 + [Y_m - Y_p]^2)^{1/2} - ([X_g - X_p]^2 + [Y_g - Y_p]^2)^{1/2}]$$

$$L_r = K_r + C_r\,[([X_m - X_p]^2 + [Y_m - Y_p]^2)^{1/2} - ([X_r - X_p]^2 + [Y_r - Y_p]^2)^{1/2}]$$

These calculations are performed by repeated passes of the cards through a calculator. The radicals may be evaluated automatically by rational approximation, by an iteration of the Newton-Raphson type, or by reference to a table on punched cards. The last method becomes efficient for a large volume of work if the arguments under the radical lie within a relatively narrow range.

The results of these calculations, the sets of radio-positioning dial readings,

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BIW PX-350 Stripper Type Tubing Head

The BIW PX-350 is an efficient and economical method for suspending tubing on completion and, later on, for working over the well or putting it on pump. The Tubing Head can be converted readily into a threaded hanger suspension-type tubing head, a slip suspension-type pumping head, or it can be equipped with a gas lift hanger.

Figure 2 shows the construction of the heavy duty Neoprene stripper. This stripper permits running and pulling tubing without the use of additional blowout preventer equipment. The one piece rubber packoff is molded into a steel spider ring to prevent stripper motion while the tubing is being raised or lowered. Tubing collars are passed readily; well pressure is sealed in effectively.

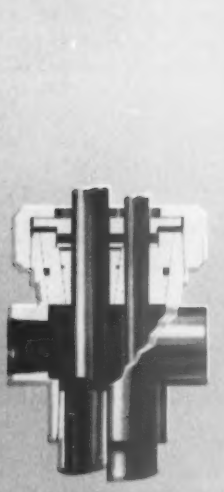

Figure 1 — Tubing Head with Gas Lift Hanger.

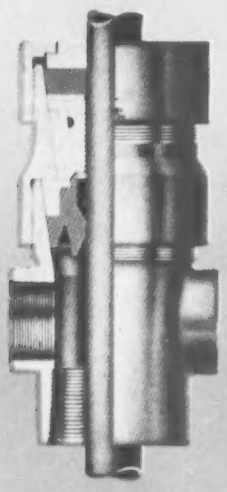

Figure 2 — Stripper Type Tubing Head.

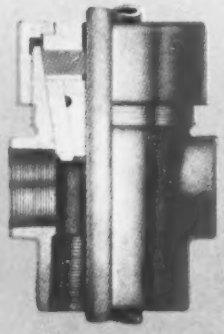

Figure 3 — Slip Suspension Type Pumping Head.

BIW

BEAUMONT IRON WORKS CO.

Beaumont, Texas

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General Sales Office: 1404 DUNLAVY ST., HOUSTON 19, TEXAS

Warehouses in Beaumont and Odessa

The head, as shown in Figure 1, can be converted to a gas lift head by removing the stuffing box assembly, slips, slip bushing, slip bowl, and stripper assembly, and substituting a gas lift hanger. The gas lift hanger utilizes slips for suspension or the gas pipe and is threaded for the tubing connection.

The ease of conversion to an efficient pumping head is shown in Figure 3. The stripper assembly and slip bowl are removed. The slip assembly is seated in the body of the head, and the stuffing box is made up on the body of the head instead of on the slip bowl.

Every day for years this head has been proving itself in economy and long life in East Texas and in the Permian Basin. Find out the other important advantages that cut costs all during the life of the well.

are available in punched-card form at the end of the calculating operations. By reproducing intermediate result cards, a final card is obtained. These cards may then be sorted into any convenient sequence prior to making a listing for each boat for each day.

In this application a series of repetitive hand calculations including reference to tables of square roots are replaced by more rapid and accurate punched-card operations.

CATHODE-RAY TUBES in IBM electronic data processing machines are known technically as "electrostatic storage units." They comprise the heart of the machine through which all information to and from other components must pass.

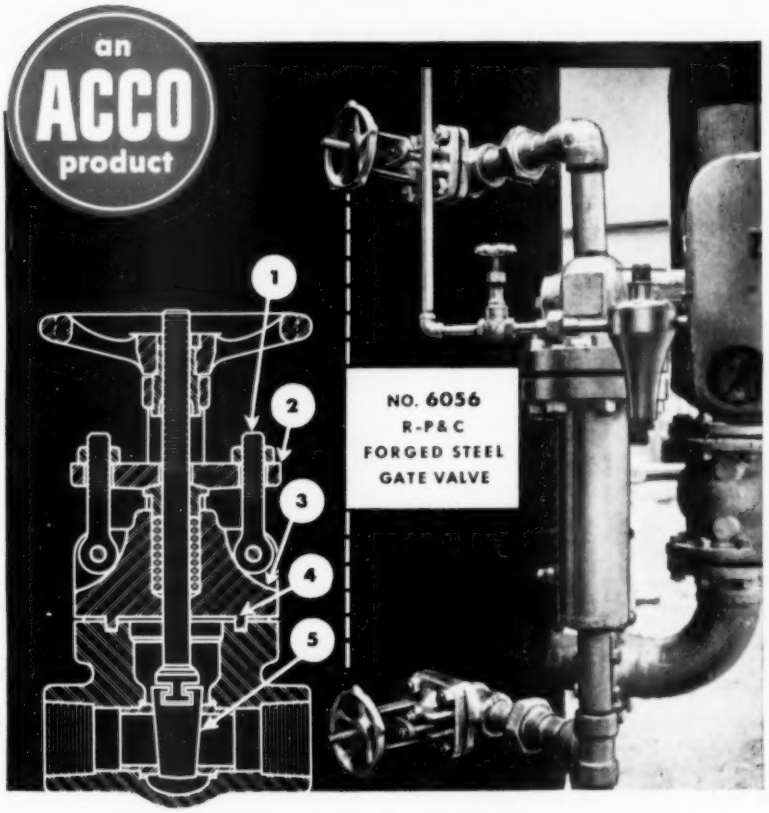
BOOKS

HANDBOOK OF TV AND FILM TECHNIQUE. By Charles W. Curran. Published by Pellegrini & Cudahy, 41 East Fiftieth Street, New York. 120 pp. $3.

This little volume presents the basic facts about producing theatrical and nontheatrical films, and has a section on the production of films for TV programs and commercials. Film production costs, methods, and practices are covered in nontechnical language so that the lay reader understands just what the producer does and how he does it.

THE FINANCIAL POST SURVEY OF OILS, 1953 EDITION. Published by Maclean-Hunter Publishing Co., Ltd., Montreal. 360 pp. $3.

This volume reviews oil and natural-gas companies, both active and inactive, in Canada, and presents maps of oil and gas fields. Statistics given include price range of Canadian oil and gas stocks, production, imports and exports, Alberta's oil-producing areas and established gas reserves, capacities of operating refineries, and consumption.



1 Stainless steel bolts and nuts. 2 Two-piece gland and follower. 3 Bolted bonnet. 4 Tongue and groove joint. 5 Hardened wedge, chrome plated.

Why Gas Absorption Plant Chose These R-P&C Valves

● Because of the plant's isolated location the engineers felt they should standardize on a type of valve which could be used on different lines even though chemical solutions, temperatures, and pressures varied. The No. 6056 R-P&C Forged Steel Gate Valve proved to be the answer for several reasons.

First of all it has a pressure range from 380 lbs. at 1000° F., up to 2000 lbs. at 100° F. Then with its chrome stainless trim and chromium plated disc, it has high resistance to corrosion. On top of this, it's easy to service with its stainless steel gland bolts, and two-piece gland and follower.

Best of all, although the R-P&C Forged Steel Valve is premium quality it is NOT premium priced. It comes in sizes from ¼" to 2" with screwed or welding ends. If you use valves in these sizes, see your R-P&C distributor today or write our Reading, Pa., office for literature.

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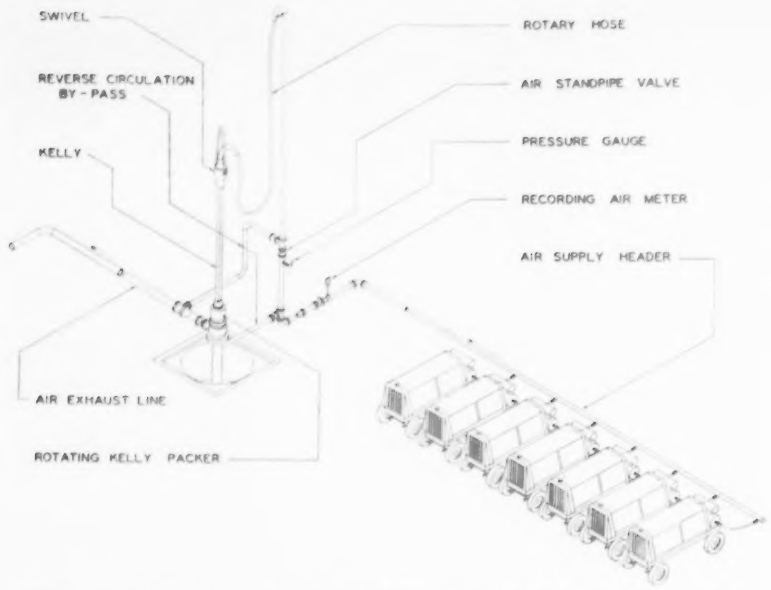


REQUIRED FACILITIES for air drilling are outlined here in schematic drawing.

New Light on . . .

Air Drilling in California

by K. M. Nicolson*

THE principal characteristics of the rotary pneumatic method (air or natural gas for circulating medium) as compared with conventional rotary drilling are:

1. Greater drilling speed and bit life.
2. Less susceptibility to loss of circulation.
3. Less possibility of injuring the producing zone by drilling fluid and particle penetration.
4. Less possibility of overlooking productive measures.
5. Less possibility of contaminating cores and cutting samples.
6. Less primary control of well pressure.
7. Less support for sloughing formations.

The principal limitations of present-day air-drilling technique are the inability to cope with water-bearing strata or sloughing formations. For drilling with natural gas or drilling with air in gas bearing zones, a considerable fire hazard exists.

Admittedly, the scope of application of air or gas drilling as we now recognize it is based on very limited experience, and it is reasonable to anticipate that with time, additional techniques and equipment will be developed that will extend this application. At this time, however, drilling with liquid circulating fluid appears to offer advantages where one or more of the following conditions prevail:

1. Where high formation pressures are anticipated.
2. Where sloughing formations are encountered.
3. Where loss of circulation is not a problem.
4. Where producing formations are not susceptible to deleterious effects from drilling fluid and particle penetration.

Drilling with air or gas, however, appears to offer advantages where formations do not tend to slough nor contain appreciable amounts of water, and one or more of the following conditions exists:

1. Severe loss of circulation.
2. Producing formations are susceptible to injury from drilling fluid or particle penetration.
3. Drilling fluid is expensive or non-available.

Application of Air Drilling in California

The recent success with the rotary pneumatic drilling method in California has been made using air for the circulating fluid. Some California operators have experimented with natural gas for circulation in the past, and they reported that improved completions were effected.[1]

Comparatively few wells have been drilled with air to date. Four operators have used air circulation on a total of 14 wells in South Mountain and Oat Mountain fields. On all of these wells, the major problem confronting the operator was severe loss of circulation in the surface hole.

At South Mountain the surface formations consist of highly fractured shales and broken volcanic formations to depths of 1,200 ft. Conventional rotary drilling has proved unattractive due to the excessive cost of combating loss of circulation, and the water supply available is insufficient for drilling with partial or no returns.

At the Oat Mountain area, west of Aliso Canyon field, the surface formations consist of dense, nodular, fractured shale with some sands and severe loss of circulation is characteristic principally above 1,200 ft. Conventional rotary methods have been expensive in this area due to loss of circulation. Here also there is insufficient water available to drill without returns. In both of these areas air drilling proved capable of penetrating severe loss-of-circulation zones economically.

Evaluation for California . . . In all of the 14 wells mentioned above, the rate of penetration while using air was higher than in comparable wells drilled with mud. The increase in drilling rate ranged from 40 to over 200 per cent greater than correlated intervals in adjacent wells drilled with mud. Table 1 shows the comparison of rates. This in-

TABLE 1—RATE OF PENETRATION

Well	Hole size, in.	Depth drilled with air, ft.	Avg. rate of penetration ft. per hour	Comparison with hydraulic drilling,* per cent increase
A	12¼	0-834	42	135
B	12¼	0-963	41	131
C	12¼	0-1,002	33	88
D	12¼	210-1,058	24	119
E	15	22-1,143	21	43
F	12¼	0-888	29	237
G	12¼	34-698	6	143

*Rate of penetration with air compared to rate with mud in adjacent wells.

*Standard Oil Co. of California, La Habra, Calif. Paper presented at spring meeting, Pacific Coast District, Division of Production, A.P.I., Los Angeles, June 2-3, 1953.

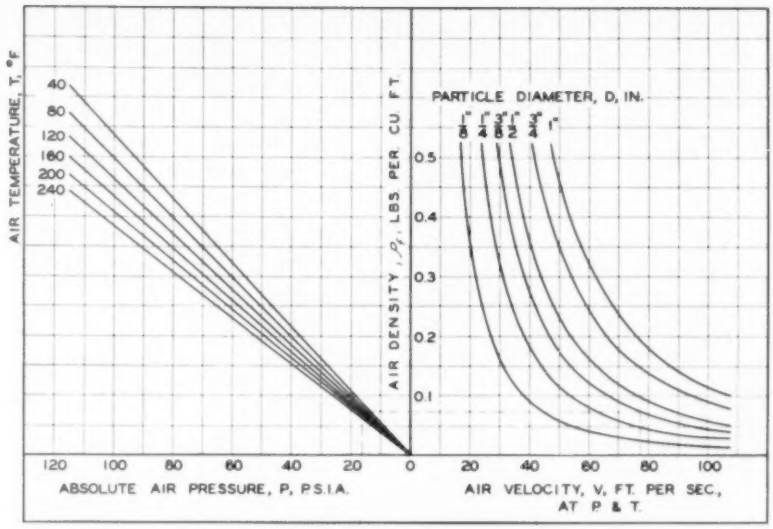


Fig. 1—Determination of air-lifting capacity.

creased rate is experienced with either air or gas drilling and is usually attributed to the following conditions:

1. Cleaner hole bottom due to extremely high velocities around the bit.
2. Absence of mud cake.
3. Very low viscosity of the gaseous drilling fluid.[2,3]

Another important characteristic of air drilling observed on all wells was increased bit life. The improvement in bit life ranged from 36 to more than 300 per cent of that obtained in adjacent wells drilled with mud. Table 2 shows a comparison. Bit-life improvement is attributable to one or more of the following factors: (1) the cooling effect of expanding air, (2) the cooling capacity of the large volumes and highly turbulent velocities of air, and (3) the rapid removal of cuttings.

The net effect of eliminating the requirement for loss-of-circulation materials, increasing rate of penetration, and increasing bit life is a substantial reduction in cost per foot of hole. Unfortunately the actual drilling costs at the air drilled wells are not indicative of the magnitude of possible saving. The principal reason for the discrepancy was the necessity to fabricate or rent compressors, air headers, kelly packers and large size drill strings. In addition to drilling costs standby charges were incurred in several cases in order to avoid delays.

As the factor of drilling cost is probably the most important consideration in the evaluation of air drilling, an effort has been made to show a comparison between typical drilling costs using air and similar costs using mud based on actual drilling costs available. The cost figures have been adjusted to show a more equitable comparison by deleting certain abnormal charges that normally would not be incurred. These costs are given in Table 3.

Mechanics; Lifting Capacity of Air

The functions performed by the circulating air in air drilling are the removal of cuttings and the lubrication and cooling of the bit. The volume of air required to drill is governed by the cutting carrying capacity of the air. The size particle that can be lifted is dependent upon the shape of the particle, and is proportional to the density and square of the velocity of the rising air column.[4] The relationship between air velocity, air density, particle shape, and particle-size lifting capacity can be expressed as:

$$V_s = 2.67\ (d\rho_p/\rho_f)^{1/2}$$

This formula which expresses the slip velocity of a sphere immersed in a fluid was derived from Newton's Law of Turbulent Resistance,

$$R_f = \frac{C_d A \rho_f V^2}{2}$$

and the gravitational force acting on the sphere,

$$F = \frac{\pi\ g\ D^3\ (\rho_p - \rho_f)}{6}$$

The quantities expressed in these formulas are shown under "Nomenclature" at end of article.

The velocity of air required to float cuttings is equal to the slip velocity of the cuttings falling in an air stream. Under these conditions the fluid resistance force is equal to the gravitational force and the above formula is derived by equating these forces. The value of the fluid drag coefficient, C_d, has been determined experimentally for spherical particles and is in the literature.

The irregular shapes of drilling cuttings vary considerably from smooth spheres but in the highly turbulent conditions found in air drilling, this factor becomes less important and the variation is not so great as to impair the usefulness of this equation. The few field measurements of particle size taken to date tend to substantiate the above approximation and the suggested formula appears to be a satisfactory criterion for the design of air-drilling equipment. The cuttings of dust proportions will in effect increase the density of the air stream, and thereby increase its lifting capacity.

The lifting-capacity formula developed above is shown graphically in Fig. 1, where the required air velocity may be determined for the particular density

TABLE 2—BIT FOOTAGE

Well	Hole size, in.	Depth drilled with air, ft.	Bits used	Average bit footage ft. per bit	Comparison with hydraulic drilling,* per cent increase
A	12¼	0-834	2	417	36
B	12¼	0-963	2	487	59
C	12¼	0-1,002	2	501	63
D	12¼	210-1,058	4	212	70
E	15	22-1,143	2	561	175
F	12¼	0-888	2	444	348
G	12¼	34-698	6	111	110

*Bit footage with air compared to footage with mud in adjacent wells.

TABLE 3—AIR-DRILLING COST COMPARISON

	Circulation—Mud	Circulation—Air
Rigup cost:		
7,500 ft. rig in and out	$6,000	$6,000
Air equipment in and out		$1,500
Total rigup costs	$6,000	$7,500
Drilling cost to 1,000 ft.—		
Mud circulation 8 days:		
Rig time	$7,200	
Drill-pipe rental	$120	
Bit rental	$2,040	
Mud costs	$1,200	
Fuel costs	$560	
Air circulation 3½ days:		
Rig time		$3,150
Drill-pipe rental		$80
Bit rental		$1,150
Compressor rental		$2,000
Kelly packer rental		$200
Fuel costs		$420
Total drilling costs	$11,220	$7,000
Saving with air, per cent		38
Total rigup and drilling cost	$17,220	$14,500
Saving with air circulation		$2,720

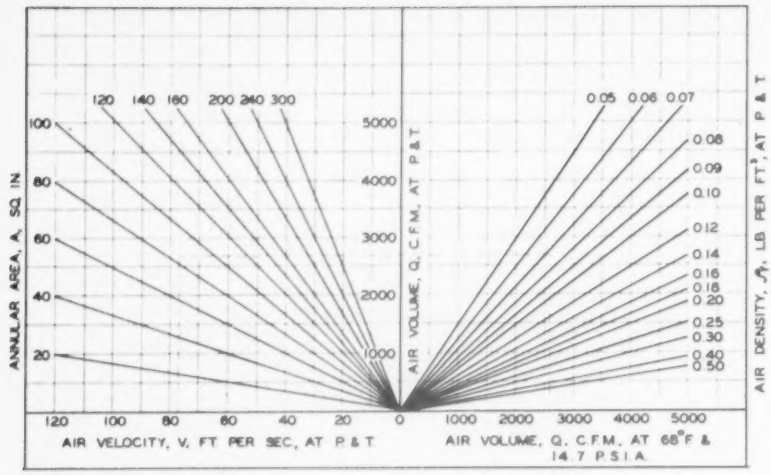

ANNULAR AREA, A, SQ. IN.
AIR VOLUME, Q, C.F.M., AT P & T
AIR DENSITY, ρ_f, LB PER FT³, AT P & T
AIR VELOCITY, V, FT PER SEC., AT P & T
AIR VOLUME, Q, C.F.M., AT 68°F & 14.7 P.S.I.A.

Fig. 2—Determination of air required for drilling.

existing in the air column that will lift a given particle size. Fig. 2 presents the graphical determination of the air volume required to provide the necessary velocity and density to carry cuttings in a given annular area. The air volume shown is given for standard conditions at sea level and the compressor capacity must be adjusted to provide an equivalent amount of air if temperature and pressure vary from these standard conditions. From the above charts it will be seen that the air velocity and density in combination with the hole size and drill-pipe size determine the air volume necessary adequately to clean the hole.

From the lifting-capacity formula it will be seen that it is possible to lift fine cuttings with a reduced volume of air. However, in actual practice the regrinding necessary to reduce the cuttings to lifting size would slow the drilling rate excessively and increase bit and drill-stem wear. It would be desirable to have sufficient air velocity to lift cuttings without regrinding, but practical considerations usually limit the lifting capacity to from ¼ to ½ in. particle size.

EXAMPLE: The air requirement to drill 1,000 ft. of 12¼-in. hole with 6⅝-in. drill pipe may be determined as follows:

1. Enter on Fig. 1 the pressure of air in the annulus (Say 16 psi.; this is 13.5 psi. barometric pressure plus 2.5 psi. friction head).

2. Intersect temperature line (assume 160° F.).

3. Read horizontal intersection on density coordinate, 0.072 lb. per cu. ft. This is the density of air at 16 psia. and 160° F.

4. Continue horizontally on density reading and find intersection with desired particle size (say ⅜ in.).

5. Read required air velocity 77 ft. per second. This is the required velocity of 0.072 lb. per cu. ft. of air which will float a ⅜-in. sphere.

6. To determine compressor capacity enter Fig. 2 at 77 ft. per second velocity and intersect annulus area, 83 sq. in.

7. Project horizontally to find volume at hole conditions of pressure and temperature and continue to intersect with density, 0.072 lb. per cu. ft.

8. Read required free air capacity, 2,600 cu. ft. per minute, to provide 77 ft. per second velocity and 0.072 lb. per cu. ft. density in annulus.

TABLE 4—CALCULATED AIR VOLUME REQUIREMENT TO LIFT ⅜-IN. PARTICLES

Hole diam. (in.)	Drill-pipe size, in. 2⅞	3½	4½	5	5½	6⅝	8⅝	9⅝
6¼	758	660						
7⅞	1,230	1,130						
9⅞		1,980	1,780	1,660	1,500			
10⅝			2,280	2,160	2,000	1,700		
12¼			3,200	3,070	2,950	2,610	1,860	
15½			5,400	5,300	5,120	4,830	4,080	3,620
17½				6,910	6,750	6,450	5,700	5,250
20¾					9,800	9,500	8,750	8,320

Note: 1. Based on lifting capacity formula $V_t = 2.67 \left(\frac{d\rho_p}{\rho_f}\right)^{1/2}$

where: $d = \frac{3}{8}$ in. diameter sphere
$\rho_p = 162$ lb. per cu. ft.
$\rho_f = 0.076$ lb. per cu. ft. at 120° F. and 16 psia.

2. Air volume, cu. ft. per minute, adjusted to 68° F. and 14.7 psia.

Equipment Requirements

Drill pipe . . . Large surface holes present a problem as considerable volume is required; however, the requirement can be reduced by using large-diameter drill pipe which will decrease the annular area and therefore the air requirement. If larger size drill pipe is not available it may be necessary to provide multistage compressors and raise the circulating pressure sufficiently to circulate the required volume. Drill pipe used for air drilling in California has included 5½, 6⅝, 7, and 9⅝-in. sizes. The volumes necessary to lift ⅜-in. cuttings in various hole sizes and with various drill-pipe sizes are shown in Table 4. The reduction in volume possible with larger sizes of drill pipe is shown which is particularly significant in the larger hole sizes.

Compressors . . . The compressor plant necessary to provide the lifting capacity as determined by hole size and pipe size is influenced by the pressure drop throughout the circulating system. Construction-type portable compressors have been used on the air-drilled surface holes covered by this report as the required pressure was within the 100 to 110-psi. compressor rating available with this equipment. The number of compressors used in parallel varied from seven to nine with combined capacities ranging from 3,000 to 4,500 cu. ft. per minute of free air. It was found desirable to provide additional capacity to allow one compressor to be shut down for repairs without interrupting drilling operations.

The 600-cu. ft. per minute machines appear to offer the best balance of capacity and portability for air drilling operations as they are the largest standard compressors mounted on four pneumatic-tire wheels. Rental compressors have been utilized as the most economical source of equipment because the requirement was of short duration. Availability of sufficient rental compressor capacity for air drilling has presented a problem which should improve as air-drilling operations become more common.

Surface air piping . . . The size of the surface manifolding including stand pipe, rotary hose, and swivel must be designed to accommodate the maximum volume of air to be circulated. The most economical pipe size is that which will not produce back pressure exceeding the capacity of the available compressors. It is advisable, however, to select pipe sizes which will keep pressures well below the maximum compressor rating if possible to allow for miscellaneous restrictions such as elbows, valves, and totco plates.

Drill-stem size . . . This is one of the

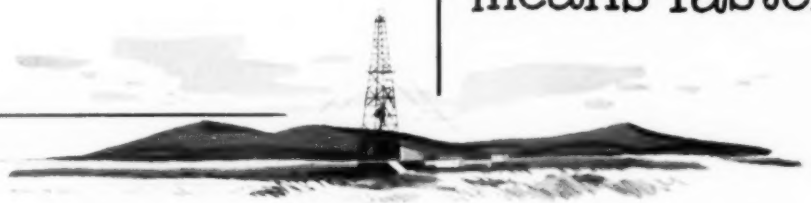
REED *TWIN-BLAST* ROCK BITS

When high-velocity slush from the nozzles of **REED** Twin-Blast Rock Bits hits the bottom of the hole, all cuttings are swept immediately up into the return mud stream.

This fast removal of cuttings means that cutter teeth are always working on new formation. The result is faster drilling, more hole per bit, fewer round trips and lower drilling costs.

Better slush action

means faster drilling!



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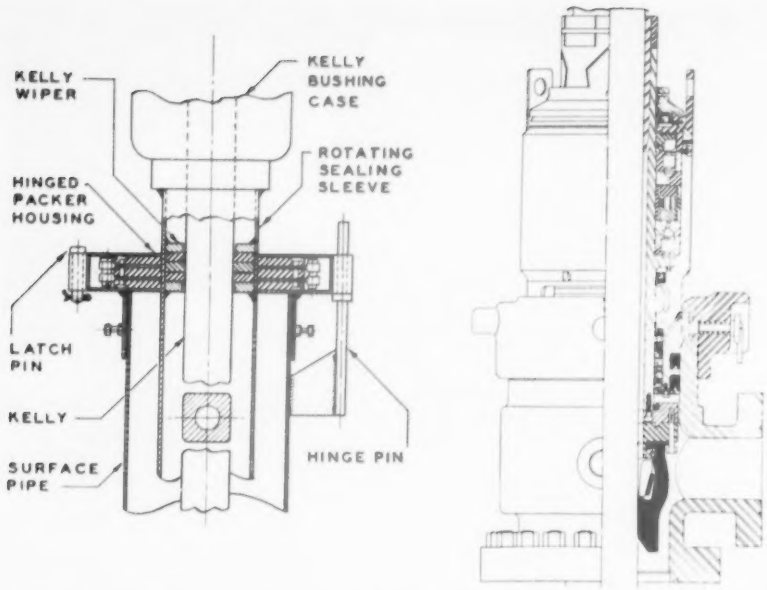


Fig. 3—At left, low-pressure, rotating-kelly packer. At right, high-pressure packer.

basic considerations in determining air requirements. In general the advantages lie with large-size drill pipe because annular area and air requirements will be reduced with corresponding reduction in pressure drop and compressor horsepower. These advantages tend to offset the additional time spent handling the larger-sized drill pipe. Table 5 shows the magnitude of pressure drop in various typical sizes of air circulating systems with 4,000 cu. ft. per minute air volume.

Table 5 illustrates the importance of drill-pipe size as it affects the volume of air. For example, the use of 4½-in. drill pipe in holes larger than 12¼ in. is inadvisable because the resulting high circulating pressures would necessitate two-stage compressors and involve a high horsepower requirement.

The hole sizes, drill-pipe sizes, air volumes, and pressures used on the air-drilled wells are shown in Table 6.

Bits used for air drilling to date have been conventional roller rock bits similar to those used in adjacent wells drilled with mud. Most of the bits, however, were bored out to provide a 2¼-in. circulation opening. A few bits were run with conventional mud nozzles, but no advantages were indicated. It is felt that the velocities are sufficiently high around the bit so that the additional air jet velocity is not accompanied by improved drilling rates, while the additional pressure drop encountered requires more compressor power. Several bits were run with special air vents to the bearings, similar to the treatment which has produced added bit life in gas drilled wells in West Texas, but there has been insufficient experience to evaluate the effects of this feature to date.

Rotating kelly packer . . . Packing off the annulus at the drilling riser and diverting dust and cuttings into the exhaust line has been accomplished through the use of rotating kelly packers. The pressure on the packer is less than 2 psi. except where reverse circulation is employed. If reverse circulation is not contemplated a simple pipe wiper packer will serve, such as the low-pressure packer illustrated in Fig. 3. The effect of reverse circulation will be discussed later and requires a conventional rotating kelly packer built to withstand several hundred psi. pressure such as the high pressure packer shown in Fig. 3.

Air exhaust line . . . The exhaust air, dust, and cuttings are conducted away from the rig through an exhaust line. The size of this line should be selected to provide a higher lifting capacity than that in the annulus so that cuttings will not be dropped in the line. Cuttings must be disposed of without creating dusty conditions around the rig floor. In remote areas this is most economically accomplished by extending the exhaust line several hundred feet on the downwind side of the rig. In populous areas it may be necessary to install spray equipment or centrifugal dust separators for control.

TABLE 5—PRESSURE LOSSES TYPICAL AIR SYSTEMS CIRCULATING 4,000 CU. FT. PER MINUTE

Item—	Length (ft.)	Size (in.)	No. 1	No. 2	No. 3
Compressor hoses	10	1½	0.6		
		2		0.3	0.4
Air manifold	150	4½	3.5		
		6⅝		0.8	
		7			0.8
Standpipe	60	4½	1.8		
		5½		1.0	
		6⅝			0.6
Rotary hose	55	2½	13.8		
		3		10	
		3½			6.4
Swivel gooseneck, etc.	6	2	12		
		2½		5.6	
		3			3.2
Kelly	60	2¾	11		
		3¼		8.4	
		3½			8.2
Drill pipe	800	4½	38.5		
		5½		22	
		6⅝			9.2
Drill collars	160	2¾	72		
		3½		30	
		4			16
Bit	1	2½	5	8	10
Annulus—12¼-in. hole	1,000		1.25	1.25	1.25
Exhaust	300	10	1.25	1.25	1.25
Press. at compressors, psi.			160.7	88.6	57.3
Theoretical adiabatic horsepower			760	576	516

TABLE 6—TYPICAL AIR-CIRCULATION CONDITIONS

Hole size (in.)	Drill pipe (in.)	Compressor capacity (C.F.M.)	Annular* velocity (F.P.S.)	Calculated lifting capacity (in.)
12¼	6⅝	4,045	113	0.77
12¼	6⅝	4,500	126	0.96
15	7	4,180	70	0.30
15	9⅝	4,045	91	0.50

*Based on surface conditions of 13.5 psia. and 80° F. and bottom-hole conditions of 16.0 psia. and 160° F.

Air-Drilling Operating Procedures

Drilling with air is not unlike conventional operations in many respects. The rig compressors are run continuously and only shut down if operations are to be suspended for several hours. One valve on the standpipe is closed to shut in all compressors which unload automatically when the pressure reaches the set maximum operating pressure (usually 105-110 psi. for construction-type compressors).

Drill-pipe connections are made by stripping the kelly and drill pipe single through the kelly packer which should be lubricated with water occasionally to reduce friction. When a bit is to be pulled the kelly packer is unlatched from the drilling riser and set back with the kelly. These operations consume some additional time until the crews become familiar with the procedure and the operations become routine.

In drilling with air, the rotary speed usually is reduced to somewhat below normal to prevent excessive kelly packer wear. Also, bit weight may be increased without adverse effect because bit life is improved with air drilling and there is less tendency to drill crooked hole.[2]

Several drilling conditions are accurately and quickly indicated by the exhaust air. For example, moisture in the hole is marked by a sharp reduction of dust in the exhaust air while plugged bit or sloughing hole will cause air returns to stop. Within seconds after opening the standpipe valves, returns are seen from the exhaust line.

Cuttings are rapidly carried from bottom hole to surface and formation breaks are readily determined from cutting samples. It must be remembered that although the air velocities are very high, only the smaller cuttings are rising near air velocity. The larger cuttings are rising more slowly or merely floating until reground to lifting capacity size.

It is common to have a fillup of several feet of cuttings when air circulation is stopped. This material is composed of the larger cuttings which were traveling slowly up the hole or were suspended in the annulus. Air should be circulated for 5 or 10 minutes before stopping circulation to make a connection or pull a bit to prevent excessive fillup.

The danger of sticking the pipe is apparently reduced under air-drilling conditions. On a number of occasions, air circulation has been stopped with the bit on bottom, and an increase in pipe friction indicated the hole contained cuttings above the bit. In all cases it was possible to work the pipe free with air circulation. It was also possible to blow the bit through bridges or cuttings without rotation.

As pointed out above, the principal use of air drilling in California has been in loss-of-circulation areas. Air can be used to advantage under these conditions because the low pressure in the annulus (less than 3 psi.) allows very little air to enter the formation and drilling may be continued unimpaired even in fractured formation.

Loss of air circulation has, however, been experienced in one or two wells. The symptoms are a reduction in air returns and size of particles. A fillup of cuttings in the hole occurs whenever air circulation is stopped which may be due to the reduction in annular velocity above the loss-of-circulation zone. The reduced-velocity air stream cannot carry the larger particles and they are held in suspension in the hole until reground to a smaller size. The partial loss of air circulation in the above cases did not stop drilling progress or appreciably slow drilling rates.

Two air-drilling holes were stopped by sloughing formation. In both instances the holes were completed with mud. The indications of sloughing formation are that the hole cannot be cleaned and repeatedly fills in with cuttings. The resulting enlarged hole also reduces air velocity so that less material is carried out of the hole. It is doubtful that means will be devised for successfully drilling these formations with air. It is possible to drill in hole that has been enlarged due to the action of the drill stem if the formation is fairly competent and does not slough excessively. Additional compressor capacity is required for enlarged hole and this possible additional requirement should be evaluated when the compressor capacity is determined.

Another limitation of air drilling has been formation water. In fact air-drilling progress was halted completely in several holes where water was encountered. Both hole and pipe were coated with a cake of cuttings which, if allowed to build up, formed a ball above the bit tending to stick the pipe. In a few cases where no free water was present in the formation, it was possible to resume drilling with air after removing the mud cake, otherwise the hole had to be completed with mud.

It is pertinent to report the experience of geophysical shot-hole drilling with air circulation where formation water has been encountered. On numerous occasions shot holes 4¾ in. in diameter have been completed to around 400 ft. after water was encountered. The technique used was to stop circulation and dump water down the hole if the cuttings tended to ball. If a moderate amount of water was flowing, air drilling has been continued with a mixture of thin mud and air being exhausted from the hole until the hydrostatic head in the annulus exceeds the compressor pressure rating. These methods have been successful except where sticky formations were encountered. It is therefore possible that this apparent limitation may be overcome by improved technique and this possibility will be discussed later under reverse circulation.

Operations other than drilling are readily accomplished with air circulation. Casing is run and landed as in a mud-filled hole. Mud or water is pumped in ahead of the cement to prevent rapid dehydration before all the cement is in place. No difference in effectiveness of cementing operations has been noted due to air drilling. One fishing job was successfully performed with air without difficulty. This work included washing over some cable tools and sidetracking and drilling past the fish. Whipstocks have been set and directional-drilling operations conducted with air circulation. Ratholes have also been drilled with air successfully.

Future Development

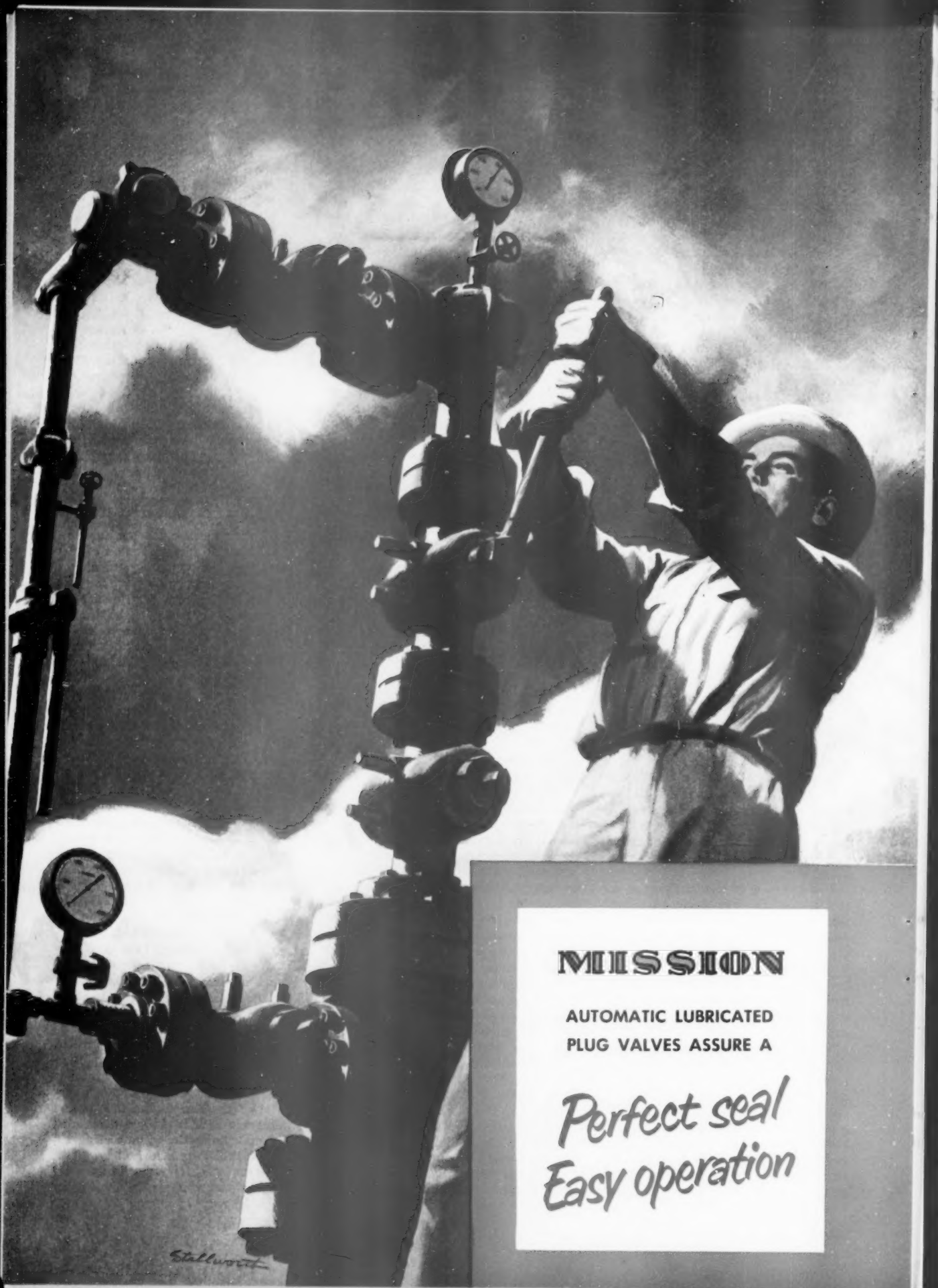
The future development of air drilling may broaden the application of this method by improvement in techniques and the development of special air equipment. The conditions which at this time appear to favor the use of air drilling have been enumerated as those where formations do not tend to slough nor contain appreciable amounts of water and where one or more of the following conditions exist: (1) severe loss or circulation, (2) producing formations are susceptible to injury from drilling fluid or particle penetration, or (3) drilling fluid is expensive or nonavailable.

It is entirely possible that air drilling may compete with conventional rotary drilling in some areas, due solely to the saving in bits and increased drilling speed. This will depend to some degree on the cost and availability of suitable air compressors in the future.

Reverse circulation . . . This technique shows promise of broadening the application of air drilling. Procedure consists of circulating air down the annulus and returning cuttings and air up the inside of the drill pipe. Under these conditions cutting lifting capacities are greatly increased with little increase in circulating pressure or the same lifting capacity may be obtained with a fraction of the air volume. Of equal importance, the air requirement is indejendent of the size of the hole which eliminates the disadvantage mentioned earlier concerning the volume of air required to drill large size holes.

Reverse circulation is one of the most promising means of air drilling in wet

(Continued on page 97)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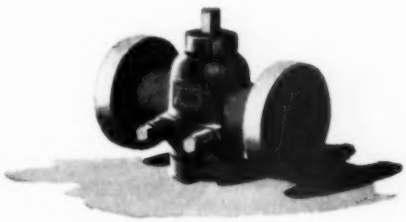

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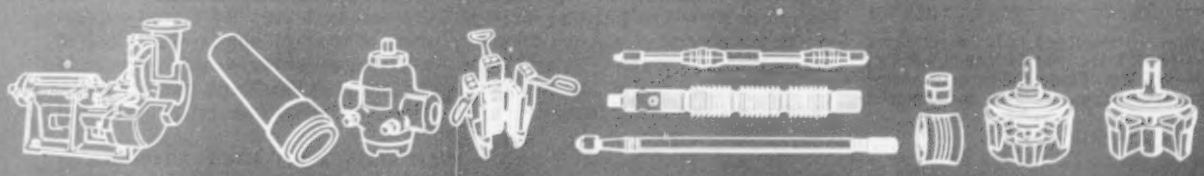


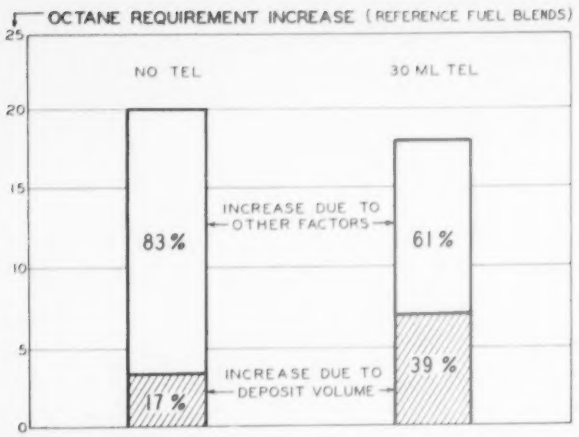


Fig. 1—Contribution of combustion-chamber deposit volume to total deposit knocking harm in an L-head single-cylinder engine.

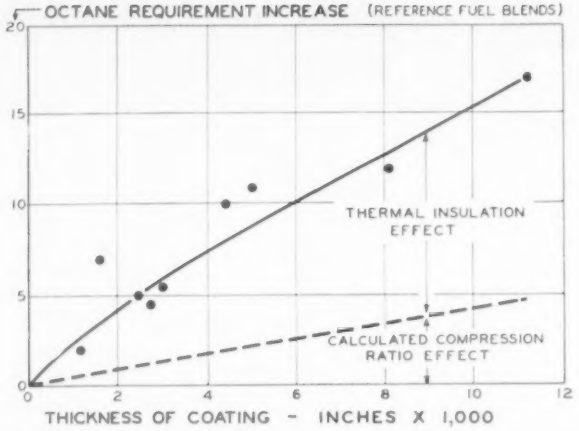


Fig. 2—Effect on octane requirement of a catalytically inert, low-heat-conductivity combustion-chamber deposit consisting of coatings of Teflon tetrafluoroethylene resin.

How Combustion-Chamber Deposits Affect Engine-Fuel Requirements

Road tests indicate that the problem of preventing knock is to be further complicated by the problem of preventing surface ignition

by J. J. Mikita and W. E. Bettoney

COMBUSTION-CHAMBER deposits increase the octane requirement of an engine either because they accelerate the reactions which lead to knock, or they ignite the air-fuel mixture, thus leading to uncontrolled combustion.

In high-compression-ratio engines—7.5 to 1 or higher—these mechanisms are interrelated and are sometimes very difficult to distinguish.

How Deposits Increase Octane Requirement

The knocking harm of deposits is a result of four main deposit effects:

- Volume
- Thermal insulation
- Surface ignition
- Catalysis

Volume . . . The physical volume of deposits reduces the clearance space in a cylinder and thus increases the compression ratio. This effect has been investigated in several single-cylinder engines. The engines were operated for a period of 70 hours during which the total knocking harm of the combustion chamber deposits was determined by measuring the octane-requirement increase.

At the conclusion of the test the volume of deposits was determined and its contribution to compression ratio was calculated. A deposit-free engine calibration of octane requirement versus compression ratio was used to determine the octane-requirement increase caused by the volume of the deposits.

Typical results of such tests conducted with unleaded fuel and with a fuel containing 3.0 ml. TEL per gallon are summarized in Fig. 1. These data, together with additional information from other similar experiments, have shown that from 10 to 40 per cent of deposit knocking harm is due to the physical volume of deposits.

Thermal insulation . . . Thermal conductivities measured in the authors' laboratory show the following average results for piston-top deposits accumulated during 130 hours of operation of a passenger-car engine. Deposits, especially those formed from unleaded fuel and which are essentially only carbonaceous material, are almost as poor heat conductors as asbestos.

	Thermal Conductivity B.t.u./hr./sq. ft./°F./ft.
Leaded fuel deposits	0.217
Unleaded fuel deposits	0.138
Asbestos	0.135

That the surface temperature of deposits increases substantially with deposit thickness is indicated by changes in the chemical composition of successive deposit layers. The facts are that deposits are good thermal insulators, they attain high surface temperatures, and they have a substantial heat capacity. They increase the gas temperatures and therefore octane requirement by:

1. Heating the charge drawn into the cylinder.

2. Reducing the rate of heat dissipation from the combustion gases. The importance of thermal insulation was demonstrated when the octane requirement of a clean single-cylinder engine was substantially increased by coating the cylinder head with various thicknesses of Teflon, a noncatalytic material

Authors are associated with the petroleum laboratory, E. I. Du Pont de Nemours & Co., Wilmington, Del. Portion of paper presented at W.P.R.A. national meeting, San Antonio, 1953.

having very poor heat conductivity (0.145 B.t.u./hr.sq.ft./°F./ft.).

As shown in Fig. 2, a coating of Teflon 0.006 in. thick increased the octane requirement of the engine 10 units.

Surface ignition . . . The surface of glowing deposits either attached to the wall or floating in the gas space can cause ignition of the charge. If this ignition occurs before the spark is passed, it is termed preignition and is equivalent to advancing the spark. Inflammation of the charge 10° before the passage of the spark can increase octane requirement 5 to 10 units, just as would a corresponding increase in spark advance.

Hot deposits may also ignite some part of the charge after passage of the spark and this is termed postignition. This phenomenon may also increase octane requirement for the reason that the combustion control which has been very carefully designed into the combustion chamber is virtually lost when inflammation occurs at one or more uncontrolled locations in the chamber.

Confirmation of the important effect of deposit particles on preignition was obtained at the DuPont laboratories by injecting particles into the combustion chamber of a car on the road. The induction system of a six-cylinder passenger-car engine was modified so that a small quantity of relatively large deposit particles could be injected at the start of a wide-open throttle acceleration.

Before deposit injection only an occasional preignition was observed during repeated accelerations from 10 to 60 m.p.h. with a 70-octane-number primary reference fuel and basic spark setting of 20° after top dead center. However, the injection of 1 g. of either leaded or unleaded fuel deposits caused a number of preignitions to occur during the acceleration. Both leaded and unleaded deposits can induce preignition when small particles enter the combustion space. Leaded fuel particles are slightly more harmful.

Laboratory experiments . . . Similar experiments were conducted using a single-cylinder laboratory engine with a spark advance of 10° before top center. It was found that increasing particle size increased the number of preignitions and also their severity as judged by the point in the cycle at which preignition occurred.

Of particular interest was the observation that neither pure lead compounds nor pure carbon causes appreciable preignition but that combinations of the two are very active. Most lead salts catalyze the oxidation of carbon, not only causing it to ignite more readily, but accelerating the reaction rate so that higher surface temperatures result. This is a probable explanation for the preigniting tendencies of these mixtures.

It is believed that unleaded fuel deposits are more harmful than pure carbon because they contain small amounts of metal contaminants from engine wear and possibly from oil additives. It has been found that small amounts of many salts promote the oxidation of carbon and cause preignition.

The preignition problem is accentuated at high compression ratios and the time will come, if it is not already here, when preignition will limit engine compression ratios.

Catalysis . . . It is reasonable to suggest that very hot deposits on combustion-chamber walls can catalyze the reactions leading to knock; however, this is a very difficult theory to prove in an engine. An ideal technique for this experiment would be to coat the deposits with a very think film of some noncatalytic substance, thus isolating the deposits from the gases without substantially interfering with heat transfer. Although many such materials have been tried none have been found which could withstand the high surface temperatures of the deposits.

In a further attempt to isolate the contribution of catalysis to deposit knocking harm, experiments were conducted in which the effects of various dusts of lead salts and actual engine deposits were introduced into a clean combustion chamber in the form of finely divided particles of 28 to 58μ particle size.

None of the materials increased the tendency for the engine to knock. On the contrary, lead chloride, lead bromide, and lead oxide acted as antiknock agents, although rather poor ones compared to tetraethyl lead.

Although this experiment does not disprove the catalysis theory, it does indicate that relatively large quantities of lead salts in a very finely divided state and with a large surface area do not catalyze the knock reactions when introduced directly into the reacting gases.

It is possible, however, that the reacting gases forced into the interstices of the very hot deposits on the combustion chamber walls during the compression stroke of a normal engine cycle may undergo considerable oxidation. The peroxides thus formed and released from the deposits during the subsequent intake stroke may have a pronounced effect on precombustion reactions.

Octane Requirement Increase Tests

The physical and chemical character of combustion chamber deposits is largely determined by their temperature, and this in turn is a function of engine operating conditions. If sufficiently large changes are made in deposit physical properties, the deposit knocking harm may be changed and therefore changes in engine operating conditions can alter the knocking harm of deposits.

Generally speaking, high-temperature operating conditions which produce dense, smooth deposits, or operating conditions which promote very extensive deposit flaking, result in less octane-requirement increase. The effect of a short period of high-temperature, high-power operation in reducing the knocking harm of deposits which had been accumulated under low-temperature, low-duty cyclic conditions is illustrated in Fig. 3.

This effect of high power operation on engines normally engaged in low-duty service has been observed frequently and is sometimes used to reduce the octane requirement of engines in service. Similar effects have been observed following relatively short periods of operation under knocking conditions.

The violent pressure waves resulting from knock undoubtedly produce extensive deposit flaking, and the thick, lightly adhering deposits produced during normal, low-duty operation are particularly susceptible to this action.

Operating conditions . . . The effect of operating conditions can also be seen in

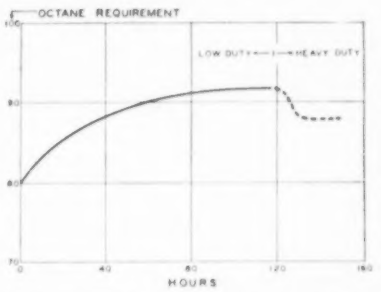


Fig. 3—Effect of heavy-duty operation in reducing knocking harm of deposits accumulated in low-duty service with a commercial leaded fuel and commercial oil.

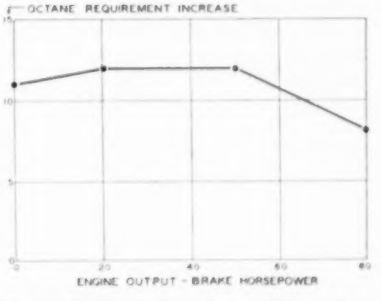


Fig. 4—Effect of operating conditions on octane requirement increase in a laboratory engine operated on a commercial leaded fuel and a commercial oil.

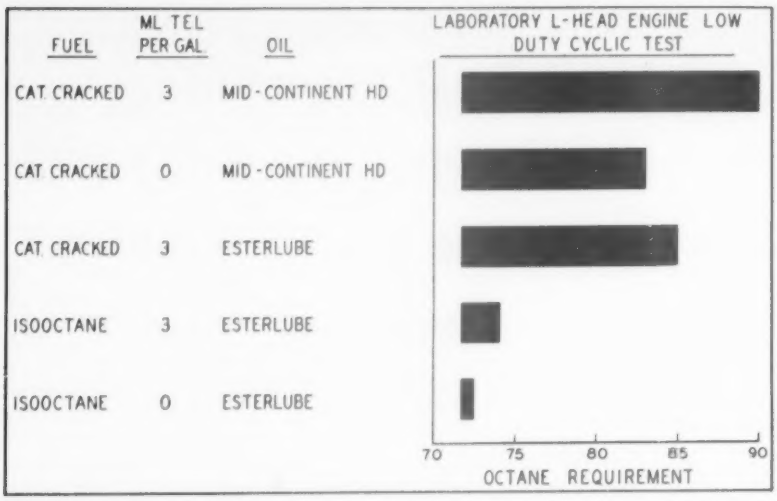


Fig. 5—Effect of various fuels and lubricants on deposit knocking harm in an engine operated in the laboratory under low-duty cyclic test conditions. Data shown are average of three or more tests on each variable.

Fig. 4, in which is shown the knocking harm of deposits accumulated with a particular fuel and lubricant during several different tests. The operating conditons of the various cyclic tests were selected to simulate either (1) very light, (2) light, (3) medium, or (4) very heavy-duty operation.

It will be noted that the knocking harm of the deposits, which was measured after the 130-hour tests, was least after operation under the very heavy-duty conditions. This occurred in spite of the fact that the throughput of deposit-forming material was much greater than for all other types of operation.

Fuel lubricant changes . . . Even more striking effects can be produced by changes in the fuel and lubricant. However, it has been observed that very considerable alterations in both fuels and lubricants are generally required before large changes in deposit knocking harm are to be noted. Apparently, even a small amount of carbonaceous material will serve as a binder for other materials and therefore, only small effects will be observed unless the amount of binding material has been greatly reduced.

This observation is supported by the laboratory test data in Fig. 5 showing the knocking harm of deposits formed by fuel and oil combinations in which one or the other material is virtually free of deposit-forming constituents. It will be noted that by far the greatest effect is achieved when using a fuel and an oil having a minimum tendency to form carbonaceous materials.

Some of the laboratory test results shown in the previous figure have been checked by means of road tests using the same combinations of fuels and lubricants. These tests were conducted by laboratory personnel operating six vehicles in convoy under mild duty conditions. The laboratory results were virtually duplicated in the road test, thus indicating a good degree of correlation between the road and laboratory test procedures.

Light-duty operation . . . Inasmuch as light-duty operation has been found to produce the most harmful type of combustion-chamber deposits, several light-duty road tests have been conducted using as a test course some of the more congested streets of downtown Philadelphia. One such test was conducted to measure the knocking harm effects of two fuels having markedly different tendencies to form low-temperature engine varnish and sludge. Fuel A was a volatile blend of 50 per cent alkylate and 50 per cent catalytically cracked distillate, while Fuel B was a rather heavy cracked distillate with some polymer and a little alkylate. Fuels A and B differed also in their performance in the FL-2 test, the latter fuel forming substantially more varnish and sludge deposits than Fuel A.

TABLE 1—Effect of Two Different Fuels on Octane Requirement Increase
Light-Duty Passenger-Car Service

ML TEL in Fuel	Car Make	Octane Requirement Increase Fuel A	Fuel B
0	X	10	10
3.0	X	9	8
1.5	Y	11	14
3.0	Y	12	13

TABLE 2—Effect of Two Different Fuels on "Critical" Requirement Increase
Light-Duty Passenger-Car Service

ML TEL in fuel	Car Make	"Critical" Requirement Increase Fuel A	Fuel B
0.	X	10(k)	10(k)
3.0	X	10(kp)	9(p)
1.5	Y	1(k)	8(p)
3.0	Y	12(k)	13(kp)

k=Due to knock only.
p=Due to preignition only.

There was a very slight tendency toward more deposit knocking harm with Fuel B than with Fuel A as shown in Table 1. More important, however, was the observation that the deposits formed by Fuel B tended to cause appreciably more preignition and it was necessary in the case of one combination of fuel and cars to use substantially higher-octane-quality reference fuels to overcome preignition than was required to overcome knock. This is shown in Table 2.

Since the average motorist would not appreciate the subtle distinction between knock and preignition, and also since the violent, loud noises resulting from preignition are more noteworthy than the knocking noise, it is obvious that more "knocking" complaints would arise from the users of Fuel B.

Preignition evidence . . . Still more evidence of the importance of preignition was obtained from the results of other light-duty road tests conducted using four V-8 valve-in-head engines of 9:1 compression ratio. In these tests the fuel required to overcome preignition was approximately two octane number units higher than that required to suppress knock.

In many instances preignition, or postignition, occurred to such an extent that the engine continued to operate with the ignition turned off. This we have called run-on; it is a manifestation of ignition of the charge by a hot surface within the combustion chamber. It is interesting to note that no such surface ignition occurred when the engine was in a deposit-free condition.

Other Papers on This Subject

Orelup, J. W. and Lee, O. I., Ind. and Eng. Chem., 17, 731-5 (1925).

Livingston, O. A. and Gruse, W. A., Nat. Pet. News, June 24, 1936, 24F-30.

Gruse, W. A., A.S.T.M., New York Regional Meeting, Symposium on Motor Lubricants, 20-34, March 8, 1933.

Gruse, W. A., The Oil and Gas Journal, 32, (27) 15 (1933).

Gruse, W. A. and Livingstone, C. J., A.S.T.M., Symposium on Lubricants, 1937, 1-28.

Bahlke, W. H., Bernard, D. P., Eisenger, J. O., and Fitzsimons, O., S.A.E. Transactions, 26, 373-79, 399 (1931).

Newby, W. E. and Dumont, L. F., "The Mechanism of Combustion Chamber Deposit Formation with Leaded Fuels" presented before A.C.S. meeting, September 14-18, 1952, Atlantic City.

Landerl, H. P. and Sturgis, B. M., "An Investigation of Combustion Chamber Deposit Formation and Scavenging Using Tetraethyl Radio Lead" presented before A.C.S. meeting, Los Angeles, March 16, 1953.

Lamb, F. W. and Niebylski, L. M., Anal. Chem., 23, 1388 (1951).

Withrow, L. L. and Bowditch, F. W., S.A.E. Transactions, Vol. 6, 724-752, (1952).

Dumont, L. F., S.A.E. Transactions, Vol. 5, No. 4, 565-76, (1951).

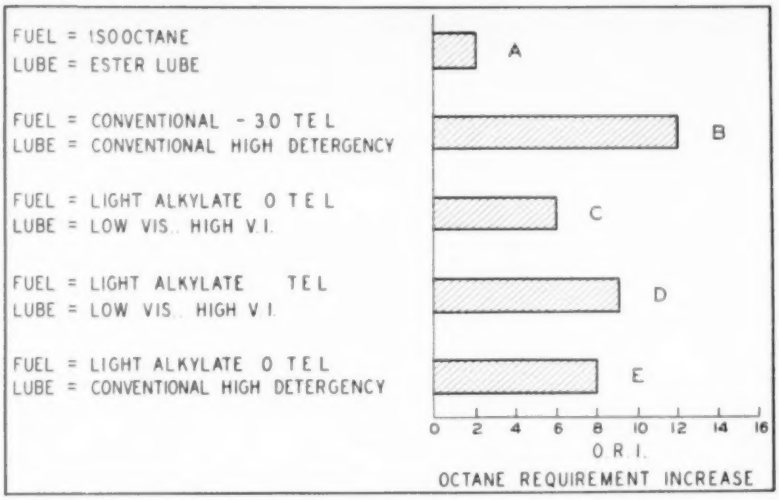

FUEL = ISOOCTANE
LUBE = ESTER LUBE
FUEL = CONVENTIONAL - 3.0 T E L
LUBE = CONVENTIONAL HIGH DETERGENCY
FUEL = LIGHT ALKYLATE 0 T E L
LUBE = LOW VIS., HIGH V.I.
FUEL = LIGHT ALKYLATE T E L
LUBE = LOW VIS., HIGH V.I.
FUEL = LIGHT ALKYLATE 0 T E L
LUBE = CONVENTIONAL HIGH DETERGENCY
A
B
C
D
E
0 2 4 6 8 10 12 14 16
O R I.
OCTANE REQUIREMENT INCREASE

Fig. 6—Octane requirement increase, low-duty, start-run-stop operation.

How Combustion-Chamber Deposits Affect Engine-Fuel Requirements—2

by M. J. Fowle*

THE experimental technique of simulating combustion chamber deposits by directly altering heat-transfer rates through the mechanism of Teflon coating the exposed metal surfaces constitutes an unusual and direct approach. This puts the main mechanism of octane-number increase where it belongs, that is, the rate of heat removal from the combustion chamber.

A three-fold problem which can be attacked by the refiner, the car manufacturer, and the producer of fuel and lubricant additives exists. To a refiner and manufacturer of automotive fuels and lubricants the combustion-chamber appetite of cars and trucks is of paramount interest, and the existence of an equilibrium octane-number requirement is something that has long been recognized.

The minimizing of octane requirement increase is of ever-increasing importance as the compression-ratio competition continues. Atlantic automotive laboratory studies check the DuPont indication of a 10 to 12 octane requirement increase under normal stop-start city operations. This fuel-lubricant-additive problem has a technical answer as shown in Fig. 6.

Bar "A" shows an O.R.I. of 2 for isooctane as the fuel and a synthetic lubricating oil. Bar "B" represents the net effect of using a high-detergency motor oil with a conventional motor fuel brought to its highest octane potential with 3.0 cc. TEL. This value of 12 O.R.I. is a good check on Mikita's 14. Staying as close as possible to petroleum, a combination of aviation alkylate for fuel and 100 vis neutral plus viscosity-index improver for lubricant results in an O.R.I. of 6.

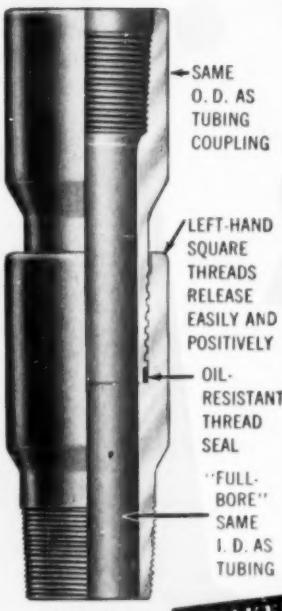
Unfortunately, aviation alkylate requires lead to meet present octane requirements and at the best only represents 7-8 per cent of motor fuel available . . . so offers no practical means of solution. Thus the use of a relatively low-molecular-weight high-viscosity-index lube oil represents the only presently known means of lessening octane requirement increase, and that but a 20-25 per cent reduction.

It would, therefore, seem that the car manufacturer and additive producer have a real job to do. Some recent data indicate that there is hope that attention to combustion-chamber design directly affects both octane requirements and octane requirement increase. It would also seem probable that the stability of combustion chamber deposits can be attacked chemically via the additive route.

Preignition complaints . . . The average motorist is not able to distinguish between knock and preignition. Therefore, since the violent, loud noises resulting from preignition are louder than the knocking noise, more complaints are received when preignition occurs.

Author with Atlantic Refining Co.

Here's the key to a "Free" TUBING STRING


SAME O. D. AS TUBING COUPLING
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You need never worry about freeing your tubing from packers and other devices that sometimes freeze in the hole after prolonged periods of use—not if you've taken the precaution to install a Baker Safety Joint strategically in your tubing string.

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A few turns to the right unscrews the Baker Safety Joint, freeing your tubing quickly and easily. And you just don't worry about the Baker Safety Joint ever freezing or sticking. It is especially designed to unscrew easily even after long periods of sub-surface exposure.

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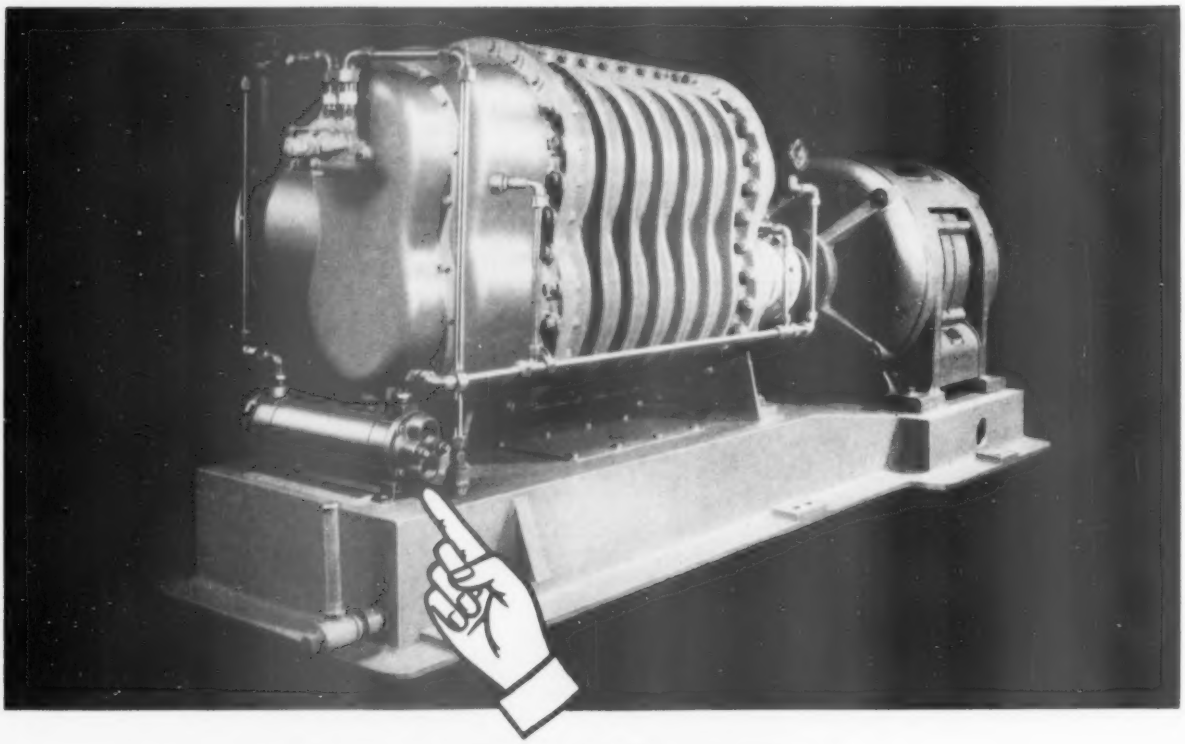

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To provide this new unit with safe, dependable lube oil cooling, Roots-Connersville Blower, a Division of Dresser Industries, Inc., furnishes a Ross Type BCF Exchanger. The "reasons why" are quite natural. Roots-Connersville rotary gas boosters and multi-stage centrifugal blowers have been Ross Exchanger equipped for years. *What better basis for selecting a component than first hand experience?*

. . . And just as past performance makes Ross Exchangers the logical choice as lube oil coolers here, so too have they become the logical choice of other leading manufacturers to safeguard temperatures in engines, speed increasers, turbines, pumps, torque converters and the like.

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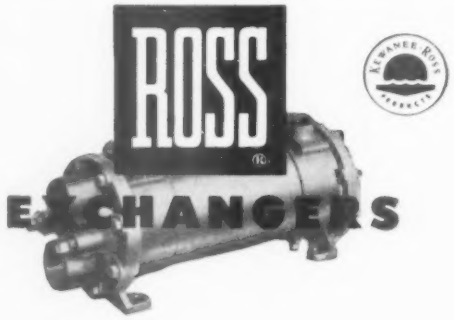

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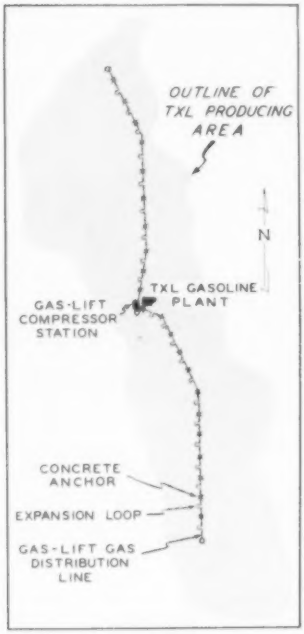
TXL CENTRAL COMPRESSOR STATION houses three compressors. A scrubber, gas aftercoolers, dehydrators and discharge metering equipment are located beyond the building.



How Shell Conducts

Gas Lift in TXL, West Texas

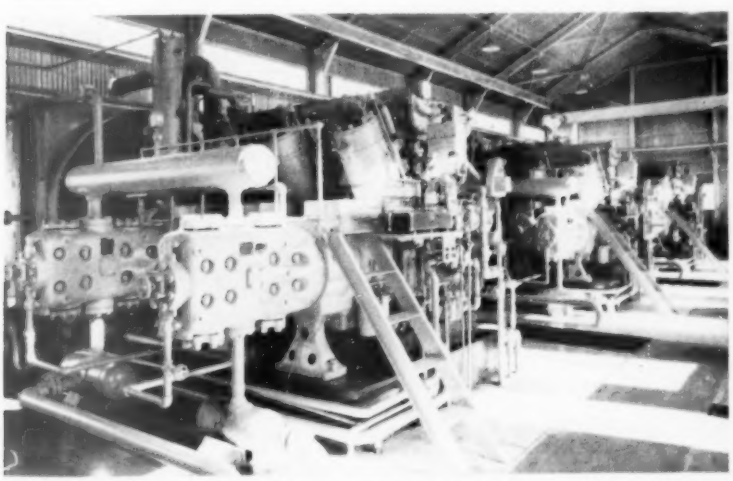
Central System, also serving Atlantic, Skelly, Ohio, Mid-Continent, produces oil from four pays

by Roy F. Carlson
West Texas District Editor

CONTINUOUS and intermittent injection of gas, four lifting depths, and both high-pressure well gas and compressed gas are all used by Shell Oil Co. in TXL field. The four different pay horizons being lifted in TXL vary in depth from near 6,000 to almost 10,000 ft. Present production ranges from less than 10 bbl. to more than 900 bbl. of fluid per day.

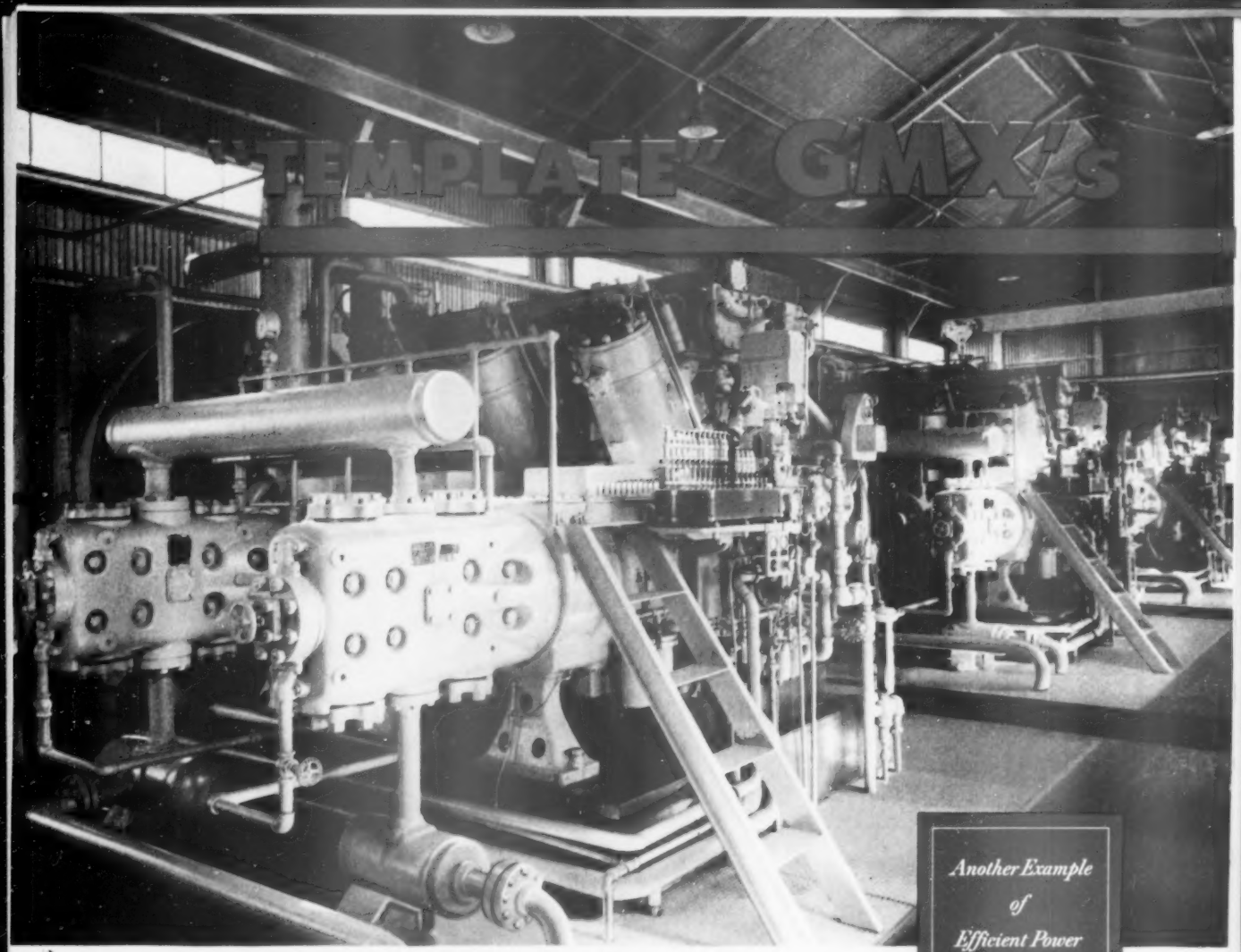
Gas for lifting purposes is from a central gas-lift compressor plant and from high-pressure gas wells; production from the later wells is scrubbed of its liquid content and piped to nearby wells for lifting purposes. Suction gas for the compressors is residue gas from the neighboring TXL gasoline plant. All wells, except high-pressure gas wells, produce against 15 to 30-psi. back pressure.

The high-pressure gas from the TXL



THESE THREE COMPRESSORS have capacity of 7,500,000 cu. ft. of gas per day (180 to 1,100 psi., in two stages). Automatic speed controls maintain constant discharge pressure.

MASTER DISCHARGE METER (one of two), measuring high-pressure gas from compressor station. Station auxiliary scrubbing, dehydrating and cooling equipment in background.



Another Example of Efficient Power at Lower Cost

ANGLE

Compressors

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San Francisco, Cal. Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle, Wash.

PAY OFF 5 WAYS

in Shell's TXL gas lift system

THE compressors shown here are Cooper-Bessemer 330 hp GMX's in the Shell Oil Company operated TXL plant at Notrees, Texas. These units, with a capacity of about 7500 M.c.f. per day, supply the high pressure gas to 15 of the 23 wells being produced by gas lift. Here, residue gas from the nearby TXL gasoline plant is compressed from about 180 psi to 1100 psi. To maintain constant pressure with minimum manual control, the GMX's are equipped for automatic speed regulation and progressive automatic shutdown.

"Template" predesign is an important feature of these modern GMX's. Here are 5 ways it pays off:

1. Pre-engineering and pre-fabrication of all water, lube, fuel and compressor piping.
2. Greatly reduced installation time. (Can be compared to a skidded unit on permanent foundation.)
3. Elimination of costly steel skids.
4. No need to specify, order and expedite auxiliary equipment.
5. The V-angle GMX, simple and extremely compact, is ideally suited to template predesign and installation.

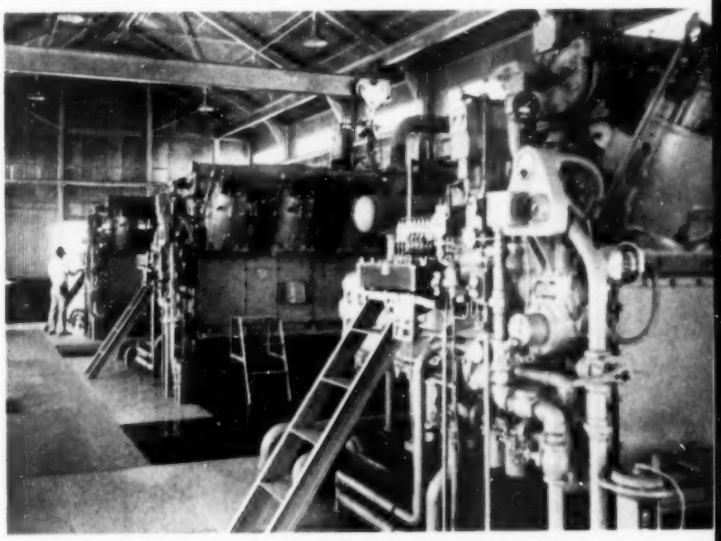
GMX compressors are built in sizes from 220 to 500 bhp.

Other Cooper-Bessemer V-angles, GMV's and GMW's, range up to 2500 bhp. Let the nearest Cooper-Bessemer office give you proof that these modern V-angles are easily your best bet.

TOP — This photo, from the compressor cylinder side, shows the 3 Cooper-Bessemer V-angles pre-engineered and fully equipped for complete "template" installation for gas lift service in the Shell Oil Company operated TXL plant, near Notrees, Texas.

LEFT — Gas lift compressor building housing the 3 "Template" GMX's. Capacity now totals about 7500 M.c.f. per day, with provision for expansion to 10,000 M.c.f.

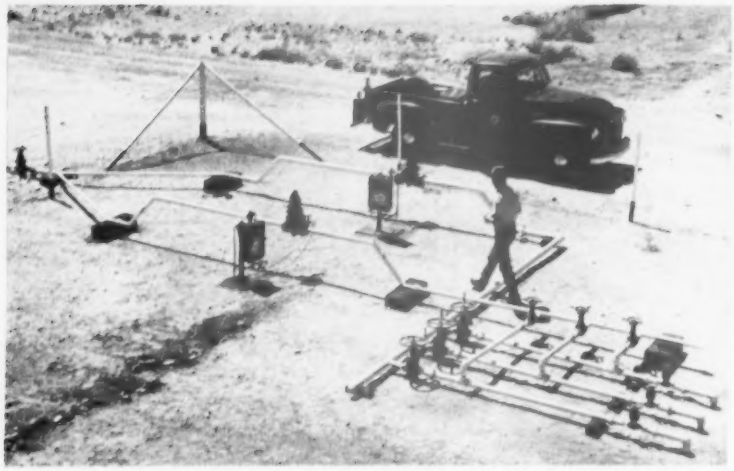
RIGHT — The GMX's, shown here from the crank-door side, were furnished complete with all engine piping and auxiliary equipment, ready for fast, simple "template" installation on a concrete foundation.



by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Tulsa Shreveport St. Louis Los Angeles Chicago



MANIFOLD serves three Shell wells, with a master system and a test system provided for each well. Two meters are also installed, one for use with the test system.

SEPARATION . . . High-pressure gas from statutory gas wells is stripped of liquid content in horizontal separator; meters measure gas to other leases.

Central High-Pressure Gas-Lift System is jointly owned by Atlantic Refining Co., Skelly Oil Co., Ohio Oil Co., Mid-Continent Petroleum Corp., and Shell Oil Co. Shell operates the compressor station and distribution system with gasoline-plant personnel.

Compressor Facilities

Three 300-hp. compressors take gas from the gasoline plant at from 180 to 200 psi. and compress it to 1,100 psi. for lifting purposes. Capacity of the compressors is about 7,500 M.c.f. per day, although the remainder of the plant is designed to handle 10,000 M.c.f. in the event more high-pressure gas is required eventually.

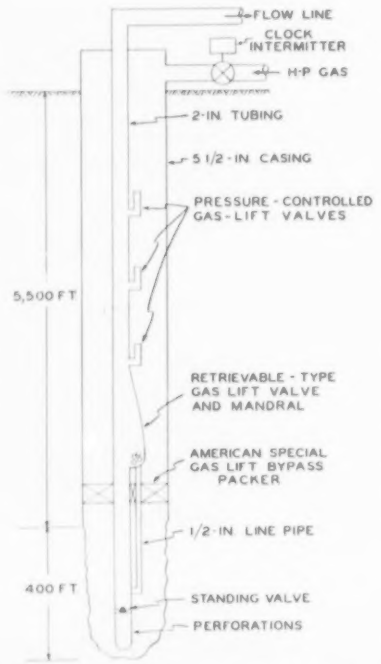
The intake gas to the compressor plant is mildly sour and contains water vapor, requiring dehydration of the gas after compression. Dehydration equipment includes a gas cooler, a scrubber, and a glycol unit, this equipment having prevented freezeups in the system since the beginning of full scale operation.

Compressor operation has been designed for a minimum of manual control. Speed regulation equipment operating from discharge pressure maintains this pressure at about 1,100 psi. If pressure builds up beyond this point, after compressors slow to their minimum speed, an automatic shutdown device will stop one compressor, and a second compressor will shut down if pressure continues to build up. If pressure still builds up, an alarm is automatically sounded. As further pressure protection, pressure-relief valves and rupture diaphragms are installed in parallel for added safety.

TXL High Pressure Gas System

Gas to the various wells that are supplied from the compressor station travels through a 10-mile-long 4 and 6-in. line running through the field. This line is designed to handle 10,000 M.c.f. of gas per day, and is composed of 39,100 ft. of 4½-in. o.d. pipe and 14,700 ft. of 6⅝-in. o.d. pipe.

Lateral takeoffs are installed in the line along with a meter setting at ½-mile intervals at points where the line is anchored to concrete blocks. Expansion loops are provided at the midpoint between the lateral takeoffs. As a safety precaution, automatic values are installed at some takeoffs which will close if the lateral breaks. Shell's high-pressure gas wells are also fitted with safety valves.



SHELL OIL'S subsurface hookup of gas-lift equipment, for a typical Clearfork well.

A total of 29 different Shell wells are being produced by gas lift, 19 of which are connected into the central compressor distribution system. The other 10 are Devonian wells which are being lifted with gas taken from statutory gas wells. They produce gas as 750 psi., a high enough pressure for lifting the oil.

Devonian Lift Operation—8,100 Ft.

Shell has 17 Devonian wells on gas lift, including the 10 mentioned above. Of these 17 wells, 5 are being lifted by intermittent injection of gas to form a slug-type lift with the remainder being lifted by continuous injection of gas into the tubing string.

The Devonian reservoir pressure stands currently at about 1,100 psi. It is a depletion-type reservoir which has been produced for such a length of time that some of the wells high on the structure have become gas wells according to Texas statutes and it is gas from these wells that is being used to lift oil in other Devonian wells. The reservoir is at a depth of about 8,100 ft.

Of the 17 Devonian wells, 10 have produced about 585 bbl. of fluid per day on test with an injection rate of about 173,000 cu. ft. per well per day. Three others produce at a rate of 50 bbl. or less with an injection of 30,000 cu. ft. of gas per day.

Silurian Gas Lift—8,500 Ft.

Shell is presently gas lifting only one well from the Silurian formation. The Silurian formation lies at a depth of about 8,500 ft. and has a reservoir pressure of about 2,500 psi. This well is a dual completion with the Ellen-

burger formation, the Ellenburger completion flowing naturally.

This Silurian lift involves running concentric strings of pipe, with the production travelling through 1½-in. line pipe which is run inside 2½-in. tubing. Gas is injected through the annulus between the two.

Average production from the Silurian is 60 bbl. per day from 4,500 ft. with 10 M.c.f. of gas injected per well per day.

Ellenburger Operation Lift—9,800 Ft.

The initial Shell well placed on gas lift in the Ellenburger formation produced fluid—both oil and water—at a rate as high as 2,000 bbl. per day from an average operating level of 5,000 ft. on test. Shell has had as many as seven Ellenburger wells on gas lift at the same time with produced fluid rates as high as 2,500 bbl. per day and as low as 100 bbl. per day. Two other wells placed on lift after the first one produced at a rate of about 600 bbl. of fluid per day from a fluid operating level at about 3,500 ft. and requiring 200,000 cu. ft. of gas per well per day.

The Ellenburger in this field is at a depth of from 9,700 to 9,800 ft. with a reservoir pressure of about 3,100 psi. It has an active water drive progressively moving updip which has caused some of the previous wells on lift to be abandoned, leaving two currently producing by this method.

Clearfork Lift—5,600 Ft.

The shallowest lift in TXL field is from the Goldsmith 5,600 or Clearfork horizon. Bottom-hole pressure in the field is about 1,800 psi. All of the Shell wells are slug-flowed through use of intermitters installed at the well head.

A sketch of a typical Shell Clearfork lift installation is shown in an accompanying diagram. In these wells a special bypass packer is set just above the casing shoe and a parallel string of 2-in. tubing and ½-in. line pipe is run through the packer, joining near the bottom of the hole. A standing valve is placed in the 2-in. tubing string just below its union with the ½-in. string.

The upper end of the ½-in. pipe is fitted into a mandrel which contains a retrievable-type gas-lift valve.

Injected gas travels down the tubing-casing annulus and at the proper pressure — controlled by the intermitter clock at the surface — enters the ½-in. pipe at the mandrel from where it moves to the point just above the standing valve in the tubing string and lifts the oil above the standing valve to the surface. Other pressure-controlled valves are placed in the string to unload liquid from the string when starting the lift.

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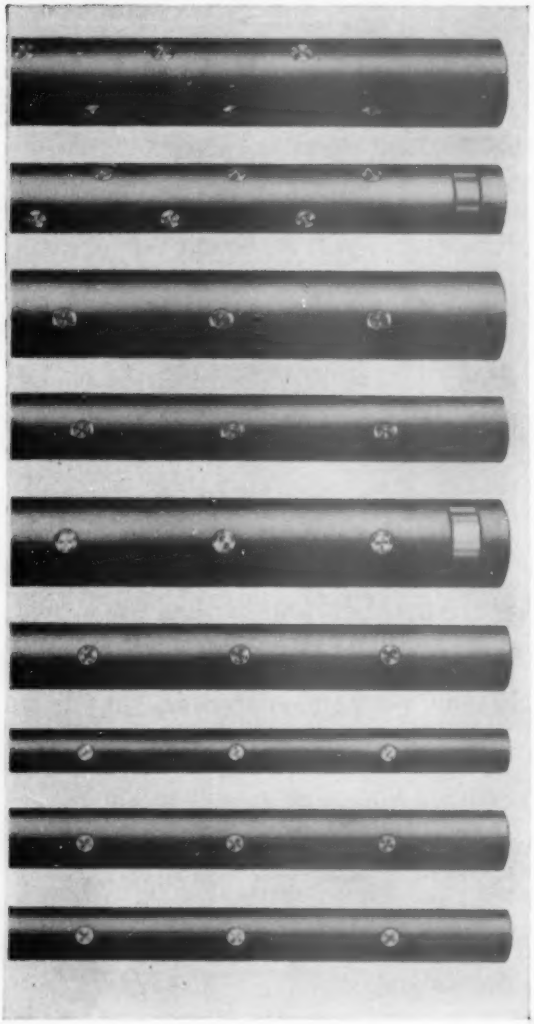

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ANNUAL SURVEY

Aviation Fuels—1952 Production

Here's how last year's fuels compared with those of the previous year. Very little difference is noted.

by O. C. Blade*

COMMERCIAL aviation gasolines produced in the United States during 1952 did not vary greatly from those produced during 1950 and 1951. Several grades of aviation jet fuel were produced during 1952, almost entirely for military purposes.

Average octane ratings of 61 commercial aviation gasolines by lean and rich mixtures testing methods, respectively, were 81.7 and 87.7 for Grades 80/87 gasolines, and 93.0 and 98.7 for Grade 91/96 gasoline. Average performance numbers were 106 and 131 for Grade 100/130 gasoline, 118 and 146 for Grade 115/145 gasolines and 110 and 136 for a new fuel, Grade 108/135, for the lean and rich mixture methods, respectively.

*Petroleum chemist, U. S. Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.

BOOK

GEOLOGY AND MINERAL DEPOSITS OF PRE-CAMBRIAN ROCKS OF THE VAN HORN AREA, TEXAS. By Phillip B. King and Peter T. Flawn. University of Texas Publication 5301. 218 pp., 30 tables, 24 text figs., 36 pls., including 3 geologic maps in color and 7 whole-tone plates of photomicrographs. $5.75 in cloth-bound volume, $5 for paper-cover volume.

This comprehensive paper was prepared in cooperation between the Bureau of Economic Geology of University of Texas and the United States Geological Survey. An appendix includes road log along U. S. Highway 80 through the Carrizo Mountains and also a report on a gravity survey at the Hazel mine written by V. E. Barnes and Flawn. The volume is amply illustrated. The maps of pre-Cambrian rocks of the Carrizo Mountains and Sierra Diablo foothills are engraved in color. Many chemical analyses and estimated modes of pre-Cambrian rocks are included in the tabular material. From an economic standpoint, the most important mineral resource of the pre-Cambrian rocks of the Van Horn area is the copper and silver deposits, and details are given on the Hazel mine, perhaps the most prolific, which has been worked intermittently since the 1880's.

TABLE 1—COMPARISON OF SOME AVERAGE DATA FOR COMMERCIAL AVIATION GASOLINE (R.I. 4982)

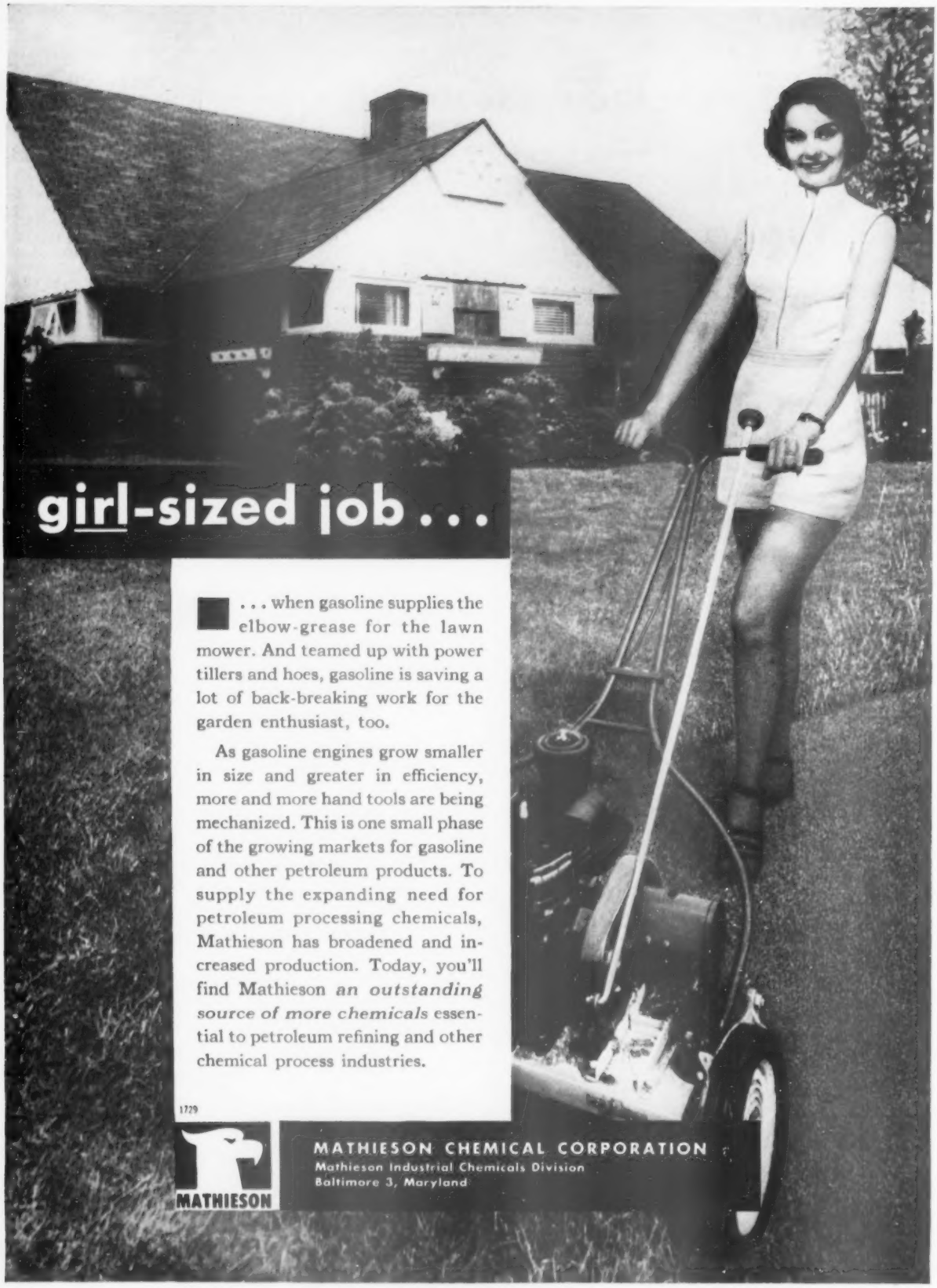
Test—	Grade 80/87		Grade 91/96		Grade 100/130		Grade 115/145		Grade 108/125
	Oct. 1951	1952	Oct. 1951	1952	Oct. 1951	1952	Oct. 1951	1952	1952
Octane number:									
Lean mixture	80.8	81.7	93.1	93.0	*0.19	*0.16	*0.69	*0.58	*0.28
Rich mixture	87.6	87.7	98.8	98.7	*1.31	*1.36	*2.93	*2.96	*1.79
TEL, ml. per gal.	0.25	0.53	3.51	3.99	3.52	4.05	4.52	4.55	2.94
Reid vapor pressure, lb.	6.5	6.5	6.6	6.6	6.7	6.6	6.6	6.6	6.6
D86 distillation temp., (°F.):									
10 per cent evap.	147	147	147	147	147	149	147	150	153
50 per cent evap.	191	191	189	193	205	204	211	213	214
90 per cent evap.	238	236	228	236	245	245	247	247	248
Specific gravity, 60°/60° F.	0.708	0.710	0.710	0.714	0.702	0.704	0.697	0.701	0.702

*Isooctane plus.

TABLE 2—SUMMARIZED DATA ON AVIATION JET FUELS (R.I. 4982)

Inspection test—	1952				October 1951			
	Grade JP-1	Grade JP-3	Grade JP-4	Referee JP-4	Grade JP-1	Grade JP-3	Referee JP-3	Grade JP-4
Number of fuels	3	6	24	1	9	23	1	*2
Specific gravity, 60°/60° F.	0.8143	0.7694	0.7780	0.7790	0.8147	0.7641	0.7923	0.7645 and 0.7583
Gravity, °A.P.I.	42.3	52.5	50.5	45.6	42.2	53.7	47.1	53.6 and 55.1
Distillation temperature, (°F.):								
10 per cent evap.	338	166	222	238	345	163	151	193 and 216
50 per cent evap.	368	316	332	348	378	313	344	289 and 297
90 per cent evap.	421	433	430	455	437	435	480	407 and 440
Reid vapor pressure, lb.		6.0	2.6	2.3		5.9	6.9	2.5 and 3.0
Freezing point, °F.	<—76	<—76	<—76	<—76	<—76	<—76	<—76	<—76
Viscosity, kinematic, —40° F., cs.	8.59		4.18	3.73	8.29	2.91	3.36	2.51
Aniline point, °F.		123.9	133.9	110.8	132.8	134.5	107	137.9 and 140
Bromine number, g. Br per 100 g.	1.57	2.30	1.91	13.0	0.95	2.59	7.3	0.96 and 1.4
Sulfur:								
Total, wt. per cent	0.057	0.081	0.075	0.301	0.079	0.085	0.35	0.074 and 0.119
Mercaptan	0.0017	0.0010	0.0010	0.003	0.0009	0.0008	0.0005	0.0017 and 0.003
Aromatic content, volume per cent	14.3	14.7	11.9	20.4	14.3	11.3	25	10.0 and 12.2
Gum:								
Existent:								
Air-jet, 400° F., mg. per 100 ml.	1.7	0.9	1.2	3.8	1.4	1.7	1.2	0.0 and 1.4
Accelerated:								
Air-jet, 400° F., mg. per 100 ml.	1.5	5.9	3.3	19.0	1.5	4.1	8.4	1.0 and 6.2
Hydrogen-carbon ratio					0.1610	0.1649	0.1570	0.1605 and 0.1709

*As only two samples were represented in Grade JP-4 in 1951 average values were not computed.


girl-sized job . . .
. . . when gasoline supplies the elbow-grease for the lawn mower. And teamed up with power tillers and hoes, gasoline is saving a lot of back-breaking work for the garden enthusiast, too.
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Air Drilling in California

(Continued from page 81)

formations proposed to date because of the high lifting capacity inside the drill pipe and the fact that cuttings will not contact with the sides of the hole or outside surface of the drill pipe. Also, fluid may be added to the air stream to improve the fluidity of cuttings if they tend to become sticky. The most important prerequisite for reverse circulation is the ability of the open hole to withstand the full circulating pressure. Table 7 illustrates the air volume and compressor horsepower required to provide a constant lifting capacity of air with conventional and reverse circulation. It is interesting to note the low compressor horsepower required with reverse circulation.

Equipment development that would improve operations and reduce costs with air drilling include kelly packers, air bits and large-size drill pipe or drill casing. The kelly packers illustrated in Fig. 3 have proved adequate for their intended purpose but improvement is possible. A quicker operating latch and higher permissible rotary speeds are desirable. It would also be worth considering a means of aligning rotary table and drilling riser to relieve the rotating packer of excessive lateral movement.

More experience will be necessary before the optimum bit design for air drilling is understood. The cleaner hole may indicate shorter-tooth bits to reduce the amount of regrinding before cuttings are of proper size for lifting. Larger circulation openings are definitely advantageous. Reverse circulations may require skirted bits to direct the air to the bottom before returning through the drill pipe and prevent bypassing air above the cutters.[5]

The savings in compressor horsepower with large-size drill pipe should bring uncommonly large pipe into use. The heavy weight of drill pipe in these sizes may result in the demand for more easily handled pipe such as casing with welded tool joints.

Nomenclature

V_s = slip velocity of sphere, ft. per second
R_f = fluid resistance force, lb. ft. per second^2
F_g = gravitational force, lb. ft. per second^2
C_d = fluid drag coefficient of sphere when Reynolds number $N_R = 9 \times 10^3$ is 0.5
d = diameter of sphere, in.
D = diameter of sphere, ft.
A = frontal area of sphere, $\frac{\pi D^2}{4}$, sq. ft.
ρ_p = density of particle, lb. per cu. ft.
ρ_f = density of fluid, lb. per cu. ft.
g = acceleration of gravity, 32.2 ft. per second^2

Bibliography

1. Wells, N. C., "Gas Drilled Wells Yield More Oil," World Oil, November 1952.
2. Scharbarum, Bruno, "Crooked Holes," The Oil and Gas Journal, November 29, 1951.
3. Payne, L. L., "The Effect of Circulating Media and Nozzle Design on Rock Bit Performance," Journal of Pet. Tech., January, 1952.
4. Streeter, V. L., "Fluid Mechanics," McGraw-Hill Book Co., 1951, page 313.
5. Quesenbury, Bill, Jr., and Berry, O. H., Jr., "Air Drilling in West Texas," Drilling, November 1951.

TABLE 7—DRILLING CONDITIONS, CONVENTIONAL VS. REVERSE CIRCULATION

Hole size (in.)	Drill pipe size (in.)	Circulation direction	Compressor* capacity (C.F.M.)	Compressor horsepower
12¼	4½	Conv.	3,250	585
	4½	Rev.	400	20
	6⅝	Conv.	2,600	220
	6⅝	Rev.	1,000	50
15	6⅝	Conv.	4,400	590
	6⅝	Rev.	1,000	50
	9⅝	Conv.	3,200	330
	9⅝	Rev.	3,200	330

*Based on constant ⅜-in. lifting capacity.

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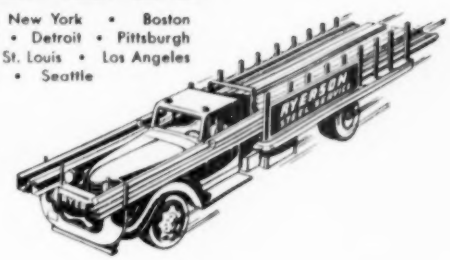

Globe Solves Pressing Air-Pollution Problem

(Continued from page 65)

The tube bundle of the sulfur cooler is arranged in three sections, so that steam may be applied to one or more sections on the tube side during startup operations, and later replaced with cooling water, after the plant load has increased.

The quantity of liquid sulfur circulated is dictated by the heat load on the system, and the sulfur circulation rate is maintained at sufficient rate so that sulfur is not heated to the viscous condition which appears at approximately 320° F.

During initial startup operations it is necessary to charge the sulfur scrubber-condenser to an operating level with elemental sulfur. The sulfur product draw from the sulfur circulating system is controlled by means of a liquid-level controller located at the base of the sulfur condenser, and a steam-jacketed, diaphragm-operated motor valve regulates the flow of liquid sulfur to the sulfur storage tank. The liquid sulfur in the sulfur storage tank is maintained in a molten condition by means of a steam-heated tubular element located in the bottom portion of the tank, and the steam pressure on this heating element is maintained at a pressure equivalent to a temperature of 280°-300° F. in the tank.

Sulfur circulating lines are provided with steam core lines for the purpose of maintaining the produced sulfur in a molten condition at all times, and to also maintain a sufficiently high temperature to prevent condensation of water vapor in the system, which would ultimately cause corrosion due to the formation of acid in the system.

The loading of sulfur from the storage tank is accomplished with a high-capacity, steam-jacketed rotary positive-displacement-type sulfur-loading pump, and the sulfur is shipped in a molten state in insulated tank trucks to a nearby acid manufacturer.

Utilities . . . Saturated steam produced at the heat-recovery steam boiler is available at a pressure of approximately 150 psig., and is disposed of by connection to the regular refinery steam system.

Boiler-feed water to the steam boiler is obtained from the boiler-feed-water header at the refinery-steam boiler house, and is regulated by means of a level controller, located on the heat-recovery boiler.

Instrumentation . . . The operation of the sulfur-recovery unit is substantially automatic, with the primary control on the system consisting of the back-pressure controller, PC-1. In normal practice, PC-1 is usually set to operate at a pressure of approximately 5 psi. lower than the setting on the pressure controller located on the reflux accumulator of the D.E.A. solution still, which under normal conditions vents the acid gas to flare. Under these conditions, the back-pressure valve located in the gas-treating unit would remain completely closed, and pressure controller PC-1 would maintain back pressure on the amine-regeneration still.

As hydrogen sulfide-bearing gas flows through back-pressure relief valve PC-1, ratio flow controller RFC-2 is set to bypass approximately one-third of the acid gas stream into the burner of the heat-recovery boiler, around PC-1, and thus automatically maintains the two-thirds—one-third ratio required. Ratio flow controller RFC-1 operates to proportion the correct amount of combustion air required in relation to the amount of acid gas-air ratio required for complete combustion, and will require resetting only when the analysis of the gas changes, or atmospheric conditions necessitate adjustments due to variance in air tempera-

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tures, water saturation, or barometric pressure.

The hydrogen sulfide-air mixture required for reheating the second-stage gas stream prior to entering the catalytic converter is regulated by means of ratio flow controller RFC-3, and RFC-3 is reset by means of temperature recorder controller TRC-2, which operates on the mixed-gas temperature of the second-stage stream leaving the hydrogen sulfide gas-fired reheater.

A differential pressure controller is used to furnish pilot gas to the burners, and refinery gas is available for firing the system during startup periods. A low water cutoff is utilized to shut off the gas and air supply to the gas burner in the event of a lower than normal operating water level in the steam boiler. This is accomplished by venting instrument air from the diaphragm motor valves controlling the air and gas to the burners, since the diaphragm-operated control valves are of a normally closed type.

An electronic flame eye is used as a flame sensing element at the burner of the heat-recovery boiler in order to shut off the air and gas supply, should flame failure occur. Provision is made for operating the unit manually by switching the flame failure system out of the control circuit, so that any necessary maintenance may be performed without interrupting plant operation.

Plant control tests . . . Plant control tests can be carried out by means of the Orsat gas analyzer or the Tutweiler burette; however, in order to obtain highly accurate data, it is necessary that mercury be used instead of water as the confining solution, and the three absorption pipettes in the Orsat gas analyzer should be filled with chemicals as follows:

No. 1 absorption pipette should be filled with a saturated solution of red chromium trioxide in concentrated sulfuric acid.

No. 2 pipette should be filled with a 15 per cent aqueous solution of sodium or potassium hydroxide.

No. 3 pipette should be filled with alkaline pyrogallol.

No. 1 pipette, containing chromic acid mixture, should be used for the determination of sulfur dioxide in the products of combustion from the heat-recovery boiler, or can be used for the determination of total hydrogen sulfide and sulfur dioxide in the vent gas from the unit.

Engineering services and plant equipment were furnished by Graff Engineering Co., of Dallas, and construction of the sulfur-recovery unit was carried out by Globe Oil & Refining Co.'s own erection forces.

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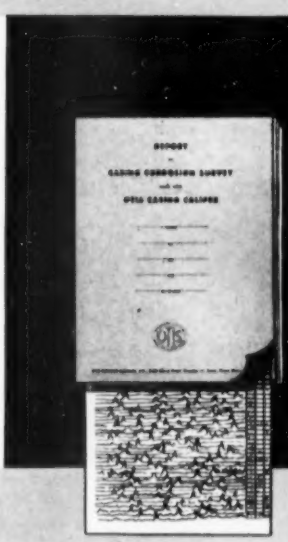

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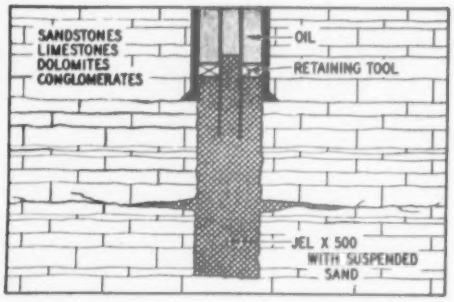
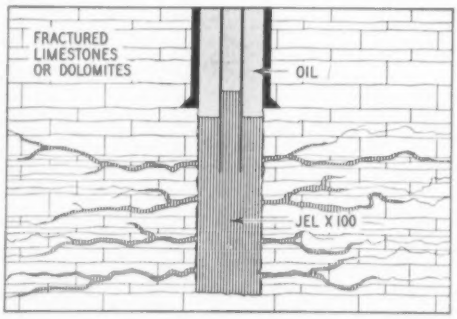
Here are the Dowell Services using Jel X materials:



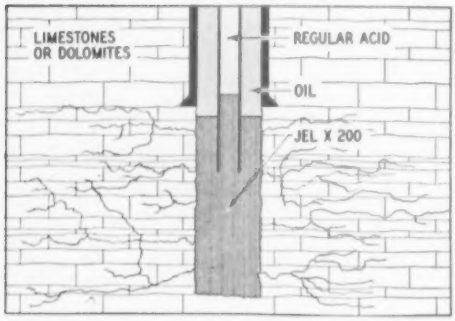
STRATAFRAC

This fracturing service using Jel X 500 has proved effective in limestone, dolomite, sandstone, and conglomerate formations. Stratafrac treatments are designed to dissolve soluble materials including silicates, paraffins and other heavy hydrocarbons and to open new fractures or extend old ones. They carry suspended sand into existing fractures as an abrading and propping agent. No jel-breaker solution is needed following a Stratafrac treatment.



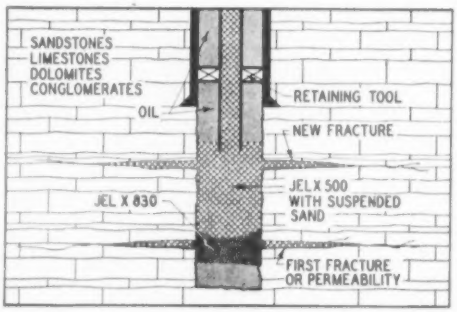
ETCHING ACID

This service utilizes Jel X 100 to permit greater penetration by the acid before it becomes spent. In formations normally requiring large amounts of regular acid, Etching Acid treatments have achieved comparable results with much less acid. They are designed to etch and enlarge "vugs", clean fractures by removing mud, silicate and feld-spar materials, permitting better drainage.



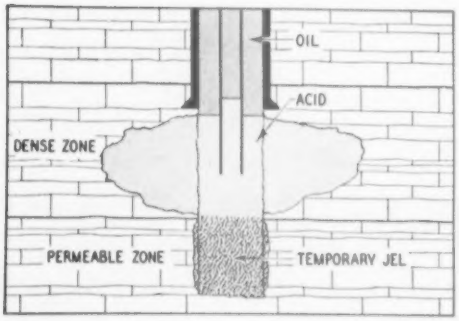
CHANNELING ACID

Channeling Acid Service uses Jel X 200 to form channels deep into pay formations. The acid in this case is mechanically diverted into a relatively few pores. This permits entrance of acid into zones far from the well bore, reaching production which might otherwise remain untapped. Channeling Acid treatments have proved particularly effective in retreating old wells.



FIXAFRAC

Fixafrac is a new temporary plugging service using Jel X 830. It is designed for use between stages of Dowell fracturing treatments to divert treating fluids into different sections. Jel X 830 carries suspended solids which react after treatment causing the material to liquefy and flow back freely to the well bore. No jel-breaker solution is needed following the treatment.



TEMPORARY PLUGGING SERVICES

These services utilize very viscous solutions (Jel X 700, 800, 820 and 900) which have proved effective in selective acidizing. They are designed to shut off the more permeable zones, permitting acid to be injected into tighter formations. Where increased plugging action is desired, the Jel X solutions can be prepared with suspended filler material. Temporary Plugging Services are particularly useful in wells having multiple zone completions.

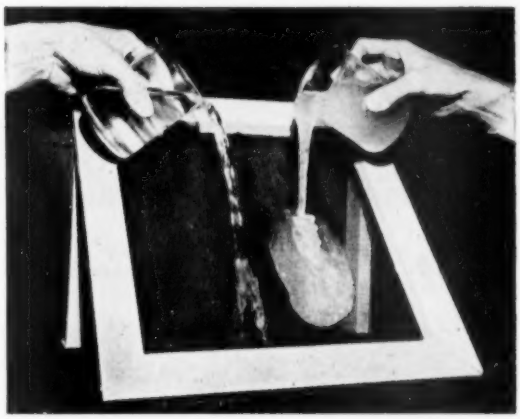
GAS PRODUCTION WITH DOWELL JEL X

Dowell Offers You Newest Improvements in Chemical-Mechanical Treatments to Improve Oil and Gas Production

Results in many fields show that Dowell Services using Jel X materials have improved the producing characteristics of all types of formations.

These services operate both mechanically and chemically, and may provide fracturing, acidizing or a combination of both in a single treatment. Results of Dowell Services and treatments have shown excellent production increases in formations that previously had proved to be unresponsive to regular acidizing.

A big, worthwhile advantage of the Dowell Services that use Jel X is the speed of treatments. Non-productive rig-time is held to a minimum with treatments often requiring as little as a few hours time. What is more, the Dowell Service method largely eliminates time-consuming mixing of chemicals on location. And it makes costly shut-in time after treatment unnecessary.



JEL X material in beaker at right is too thick to pass through ordinary window screen. After several hours it thins to free-flowing liquid at the left.

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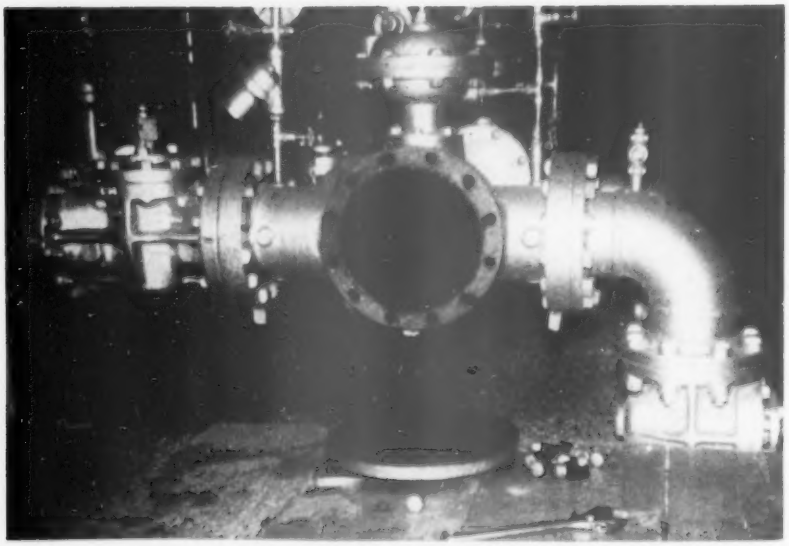
Filter unit . . . removes dust . . .



. . . from dirty line

DUST which interferes with gas-measuring and regulating equipment may be removed effectively from gas-transmission lines and distribution networks by using a truck-mounted portable dust-filter unit at desired points in the field. The method developed by Southern Counties Gas Co. of California has these advantages:

- No interruption in service is necessary.
- Dust concentrations can be reduced from 1 to 0.1 lb. per 1,000,000 cu. ft. of gas.
- Unit is portable and may be taken to any desired point along the line or system.
- It may be used in populated areas, since sound of blowing is muffled and dust is retained in filter.

Prevalent problem . . . Dust, in the form of iron and silicon oxides, is one of the problems that continually face gas-transmission and distribution engineers. Dust is always forming in pipeline systems, particularly those which handle undehydrated gas containing oxygen and sulfur-bearing impurities.

Regular dust scrubbers are rendering only partial solution to the problem.

The maintenance of metering and regulating equipment becomes especially difficult in a system undergoing expansion, since constantly increasing gas velocities are utilized. More dust is gas-borne, and it enters this equipment at higher velocities.

The adjustable-needle-type pilot valve gives the greatest trouble when an undue amount of dust is in a pipe line. Equipment containing fixed orifices is usually not affected.

Authors N. K. Senatoroff and E. Niederer, are associated with the Southern Counties Gas Co. of California. Portion of paper presented at Pacific Coast Gas Association meeting, San Jose, April 1953.

The portable filter unit was developed by Southern Counties as a result of considerable dust trouble encountered in a portion of transmission and distribution network of its San Gabriel Valley division.

Transmission-line tests . . . Decision was made to blow out one of the dust-filled transmission lines in sections. The blowing had to be done in such a manner that a minimum pressure of 30 psi. be held at all times for supplying consumers on the line. In order to do this, the pressures from adjoining areas had to be raised sufficiently to back off the regulator stations of this line. Normal pressure on the line is 100 to 125 psi.

To relieve the transmission line of any load except the consumers along the line, it was necessary to convert, by valving, a distribution line to transmission. Because of the complexity of such an operation, a detailed procedure was developed and a trial run of the entire operation performed to prove or disprove estimates of what could be done with this system under actual field conditions.

The blowing of gas through the stack in the open field removed considerable dust, but the noise and danger of air currents carrying the dust, especially into built-up areas, and causing complaints, could stand much improvement. Dust-concentration tests on this line were made before and after the operations. It was determined that blowing of the line resulted in its reduction from approximately 1 lb. per 1,000,000 cu. ft. to .1 lb. per 1,000,000 cu. ft.

Filter unit used . . . The portable filter unit was used on one line which normally carries a pressure of 55 to 60 psig. Gas was blown into the portable unit at the rate of approximately 350,000 cu. ft. per hour. The unit was then moved to another point which was at the end of a distribution header. Gas pressure was raised from other regulator stations to relieve as much as possible any load on this line and the gas was blown into the unit at the rate of approximately 150,000 cu. ft. per hour.

Data on the tests are shown in the table.

Test results . . . Both of these dust-blowing operations, one on a transmission and the other on a large distribution header, received no complaints from consumers, yet, the operation was conducted at night and in populated areas.

The advantage of this type of equipment is that the bag not only catches the dust, but the sound of blowing is considerably muffled. The unit is portable with ordinary equipment, such as a small flat bed truck. No danger of blowing dust on surrounding houses is encountered. Consumers' supply is not affected.

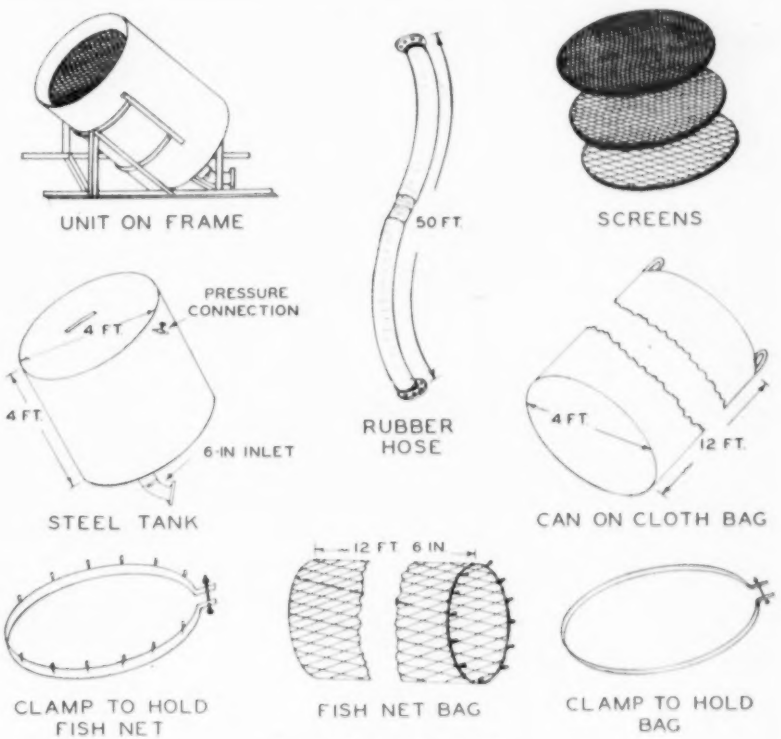
It is estimated that with a longer bag, 16 ft. long, in place of the 12-ft. unit, and covered with fish netting, that gas at a rate of at least 1,000,000 cu. ft. per hour can be blown through the bag with only a 2-in. to 3-in. water differential. With the fish netting over the bag, this large flow can be put through the bag and dust collected at a differential of 5 in. water. Should the differential rise above this point, there is danger, not from breaking the bag, but a higher differential would then have a tendency to force some of the finer particles through the flannel.

Unit description . . . The unit, as shown in the drawing, consists of a 4-ft. diameter steel tank approximately 4 ft. long, a 50 ft., 6 in. flexible reinforced-rubber hose connected at the bottom, which in turn is connected to the gas main. Three screens are evenly spaced, each having a different-diameter diamond-shaped opening, and the wire making up the screens so shaped that the screen serves two purposes:

1. As the gas passes through the screen, the screen has a tendency to swirl the gas and more or less create centrifugal force to throw the dust into the sides of the container.

2. The other purpose is to stop any large objects such as stones, steel shavings, etc., from damaging the cloth bag.

The bag portion is attached by means of a clamp to the top of the steel tank, and is 4 ft. in diameter and 12 ft. long. The bag is made of Canton flannel. Over the bag is a fish netting composed of No. 48 twine, 4½ in. stretched mesh with a breaking strength of 96 lb. The fish netting is bound with rope at the bottom and clips attached to a clamp around the steel tank.



Construction details of unit.

FIELD DATA ON PORTABLE FILTER UNIT OPERATIONS

Pipe Pres. Psi.		Pipe Line Flow M.c.F.H.		Pressure Drop Across Bag Inches W.C.		Duration of Test in Hrs.
Initial	Final	Initial	Final	Initial	Final	
20	20	350,000	350,000	1.5	2.0	½
5	5	150,000	150,000	.8	1.4	½

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PUMP SELECTION—2

Reciprocating Pumps—Capacities

by Robert L. Jacks*

THE factors involved in the capacity-head relationships of a reciprocating pump are its stroke, piston diameters, and maximum recommended piston speed. These pumps are therefore usually referred to in terms of these variables. The maximum recommended piston speed varies from about 30 ft. per minute for small-capacity pumps to as high as 120 ft. per minute for large-capacity units.

*Esso Standard Oil, Louisiana Division, Baton Rouge. Excerpt from paper in Chemical Engineering Progress, May 1953, page 235.

PUMP SIZE*	MAXIMUM RECOMMENDED PISTON SPEED (FT./MIN.)	CAPACITY OF DUPLEX PUMP (GPM OF H_2O)**
2⅛ × 1⅛ × 2	30	3.93
2½ × 1⅛ × 2	30	3.93
3 × 2 × 3	40	11.1
3 × 2½ × 4	50	17.6
3½ × 2½ × 4	50	26.2
3½ × 3½ × 4	50	42.5
4½ × 2½ × 4	50	26.2
4½ × 3 × 4	50	31.2
4½ × 3 × 6	65	40.6
4½ × 5 × 6	65	112.7
5½ × 3½ × 5	60	51.0
5½ × 4 × 7	70	77.6
6 × 2 × 6	65	18.0
6 × 4 × 6	65	72.1
6 × 5½ × 12	90	188.8
6 × 5½ × 6	65	149.1
6⅛ × 6 × 12	90	224.8
6½ × 4 × 10	80	88.8
6½ × 4½ × 8	75	88.5
7 × 3 × 10	80	3.1
7½ × 2½ × 10	80	34.7
7½ × 4½ × 7	70	98.3
7½ × 4½ × 10	80	112.4
7½ × 5 × 6	65	112.7
7½ × 5 × 10	80	138.7
7½ × 6 × 10	80	199.8
7½ × 7¼ × 10	80	291.5
7½ × 7½ × 6	65	253.6
8 × 6 × 12	90	224.8
8 × 6½ × 12	90	263.8
8 × 7½ × 12	90	351.1
8 × 8 × 12	90	399.5
8 × 9½ × 12	90	563.1
10 × 4½ × 10	80	112.4
10 × 6 × 10	80	199.8
10 × 6 × 12	90	224.8
10 × 6½ × 12	90	263.8
10 × 7 × 12	90	305.8
10 × 7½ × 12	90	351.1
10 × 8 × 10	80	355.1
10 × 8 × 12	90	399.5
10 × 8 × 18	110	488.3
10 × 10 × 18	110	763.0
12 × 1½ × 12	90	9.8
12 × 2½ × 18	110	47.7
12 × 4½ × 12	90	126.4
12 × 4½ × 18	110	154.5
12 × 5½ × 12	90	188.8
12 × 6 × 12	90	224.8
12 × 7 × 13	95	322.8
12 × 7 × 18	110	373.8
12 × 7½ × 18	110	429.2
12 × 8 × 12	90	399.5
12 × 8 × 18	110	488.3
12 × 10 × 18	110	763.0
12 × 12 × 20	115	1148.0
12 × 12 × 24	120	1198.5
14 × 8 × 20	115	510.5
14 × 8½ × 20	115	576.3
14 × 20 × 18	110	3060.0
15 × 7 × 18	110	373.8
15 × 8 × 18	110	488.3
15 × 10½ × 20	115	879.0
15 × 10½ × 24	120	917.6
16 × 3½ × 12	90	76.5
16 × 8 × 18	110	488.3
16 × 10½ × 18	110	841.1
16 × 12 × 24	120	1198.5
16 × 14 × 24	120	1631.4
18 × 6 × 18	110	274.7
18 × 8 × 16	105	466.1
18 × 8 × 18	110	488.3
18 × 8½ × 24	120	566.5
18 × 9 × 16	105	589.9
18 × 9 × 18	110	618.1
18 × 9½ × 18	110	688.5
18 × 14 × 24	120	1631.4
20 × 5 × 20	115	199.4
20 × 6 × 12	90	224.6
20 × 9 × 15	100	561.9
20 × 12 × 12	90	898.9
20 × 12 × 24	120	1198.5
21 × 7½ × 24	120	468.2
22 × 10 × 24	120	832.3
22 × 12 × 24	120	1198.5
22 × 14 × 20	115	1560.0
24 × 3½ × 24	120	102.0
24 × 36 × 24	120	10780.0
36 × 8½ × 24	120	601.4

*Pump size is given as (stm. cyl. diam.) x (liq. cyl. diam.) x (stroke)

**GPM is for max. recommended speed with 15% slippage & neglecting the size of the piston rod. The normal design speed is about 75% of this figure

06.016A

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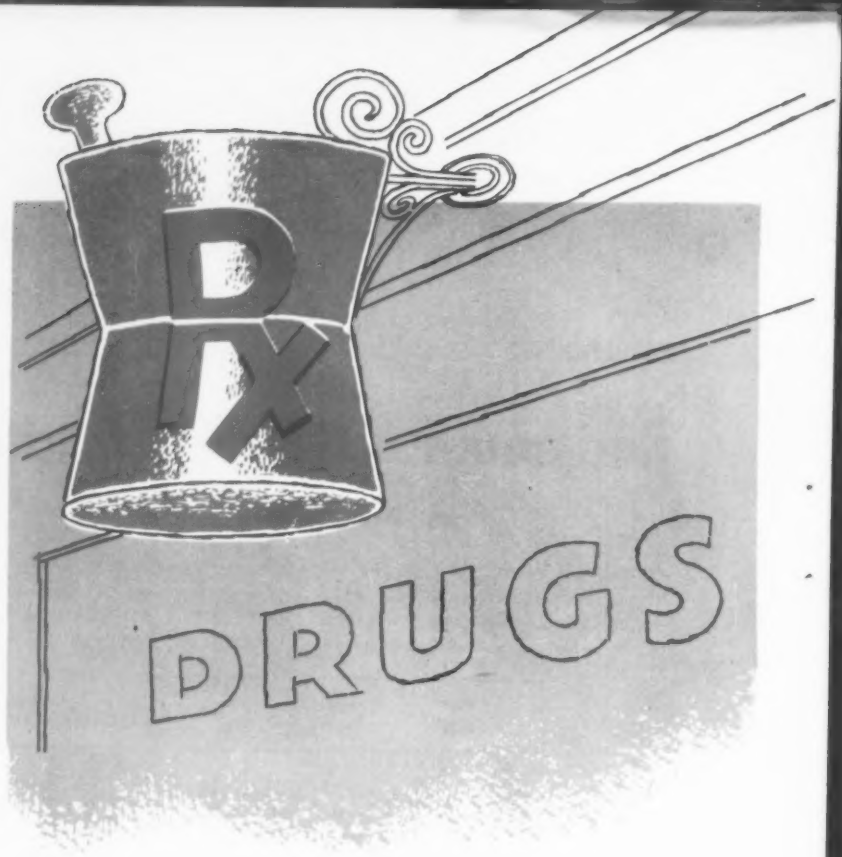

That's right... a Lane-Wells perforating job is worked out like a prescription to meet *your* individual conditions. That means the right *type* of gun and the right *size* of gun. It means the right kind and size of Bullet or Koneshot charge, or the one right combination of Bullet and Koneshot where combination perforating is best.

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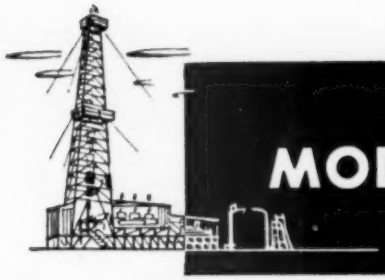
by
Walter C. Richards*



How to Make Sure Your Slings Are Safe—2

FIRST installment on this subject appeared in Journal issue of June 22. The basic principles of wire-rope slings were discussed.

How to Calculate Diameter of Rope Required

To determine the diameter of rope to be used for given conditions, the stress in each leg of a two-legged sling is taken as equal to half the load divided by the sine of angle at which leg is inclined to the horizontal.

Fig. 7 shows how the tension in the rope increases as the angle with the horizontal decreases. For example, Diagram "F" demonstrates what a very high tension is produced when a sling is used at a very flat angle.

Fig. 6 (sling-angle calculation) may be used in determining the safe load capacity of a given sling or in calculating the proper rope to use for a given load.

The sloping lines correspond to the legs of the sling taken at intervals of 5°. They may be used as shown by the diagram in the upper left-hand corner to determine the angles formed by the legs at the ring or link, and with a horizontal plane.

To illustrate this, a triangle is shown in heavy lines, one side of which is detailed as the leg of a sling. The legs form the 60° angle "A" at the top, and two 60° angles "B" at the bottom, between the legs and a horizontal plane.

The angle of spread (at ring or link) is shown in the vertical Column A. The figures shown under B are the angles between the legs and a horizontal plane and are the ones used in the calculations. Under C are the factors to be used in determining the safe load capacities and under D the factors used when calculating the diameters of the rope required.

*Chief engineer, A. Leschen & Sons Rope Co.

Diam. of Each of the Eight Rope Parts	In Tons of 2000 Pounds					
	Vertical Hitch	Choker Hitch	Basket Hitch			
			Vertical	60°	45°	30°
1/4	.8	.6	1.6	1.3	1.1	.8
5/16	1.8	1.3	3.6	3.1	2.5	1.8
3/8	3.2	2.4	6.4	5.5	4.5	3.2
7/16	5.0	3.7	10.0	8.6	7.1	5.0
1/2	7.0	5.2	14.0	12.1	9.9	7.0
9/16	9.5	7.1	19.0	16.4	13.4	9.5
5/8	12.3	9.2	24.6	21.3	17.4	12.3
3/4	15.4	11.5	30.8	26.7	21.8	15.4
7/8	19.0	14.2	38.0	32.9	26.8	19.0
1	27.1	20.3	54.2	46.9	38.3	27.1
1 1/8	36.7	27.5	73.4	63.5	51.8	36.7
1 1/4	47.8	35.9	95.6	82.8	67.6	47.8

Safe loads shown in this table provide a factor of safety of approximately five.

DIMENSIONS OF FITTINGS

Diameter of Each of 8 Parts	HOOK					Socket Size	Shackle Size	Choker Hook	
	Size	Weight	D	E	R			Size	Weight
1/4	25	1 1/2	4 3/32	1 1/4	4 3/16	1/2	1/2	2	1 1/4
5/16	26	2 1/4	4 7/32	1 5/8	4 15/16	5/8	5/8	3	3
3/8	29	6	6 1/8	1 7/8	6 1/16	7/8	7/8	4	4 1/2
7/16	31	11 1/4	7 5/16	2 1/4	8 3/32	1	1	5	8
1/2	33	20 1/4	9 1/2	3	10 1/4	1 1/4	1 1/4	6	13 1/2
9/16	34	33	11	3 1/4	12 5/16	1 1/2	1 3/4	7	30
5/8	34A	41	11 15/16	3 5/8	12 3/32	1 5/8	1 1/2	8	48
5/8	35	50	13	4	14 1/16	1 1/8	1 3/4		
5/8	35	89	15	4 1/2	15 5/8	2 1/8	2		
3/4	36A		15	4 1/2	15 5/8	2 1/8C	2 1/4		

Fig. 4.

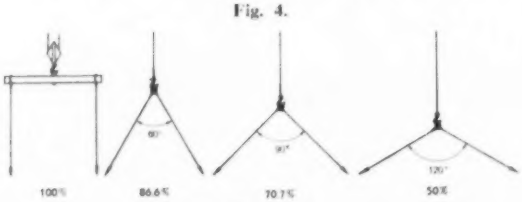


Fig. 5.

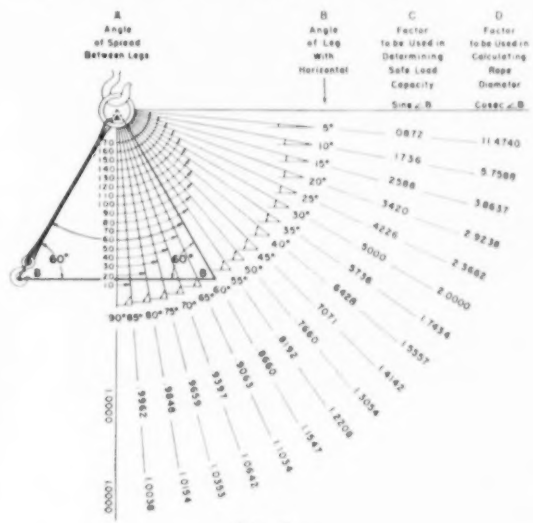


Fig. 6.

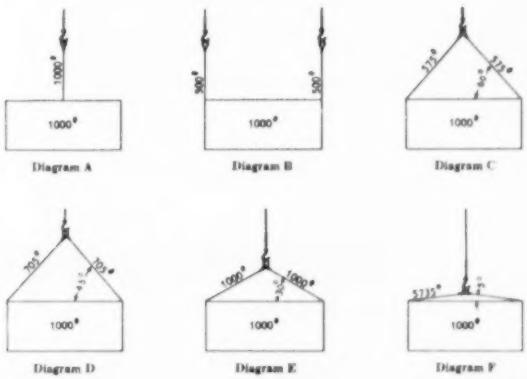


Fig. 7.

WHAT'S THE LIFE EXPECTANCY of a FAN?

"Buffalo" OFFERS THIS YARDSTICK
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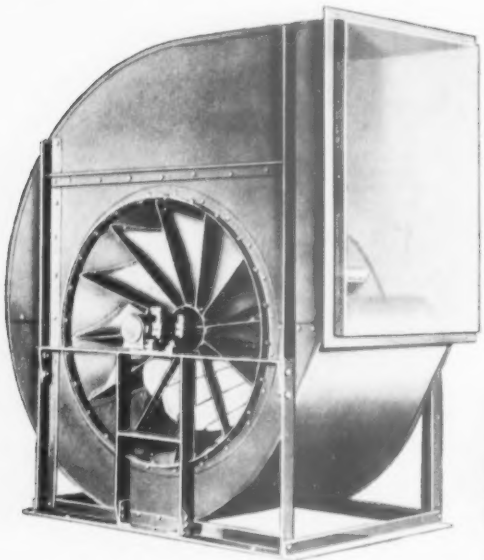

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by W. L. Nelson
Technical Editor

COST-imating

Material and Labor Costs Are Being Stabilized

FOR the first time since 1946, wages are proportionally higher than materials. Construction wages are now 70 per cent above 1946 whereas materials are larger by only 67.8 per cent. Increases based on the average of the earlier year show that material costs rose sharply during 1947-48 and again in 1951 with wages increasing somewhat constantly (see tabulation). It is expected that material prices will falter and that wages will continue to increase gradually, leading (it is hoped) to a period of stabilized prosperity.

PER CENT INCREASE IN CONSTRUCTION COSTS

	Materials	Labor
1946-47	22.4	13.5
1947-48	13.8	12.8
1948-49	3.1	7.1
1949-50	4.1	5.0
1950-51	9.7	5.9
1951-52	0.2	6.9
1952-Mar. 1953	2.1	4.2
1946-1953	67.8	70.0

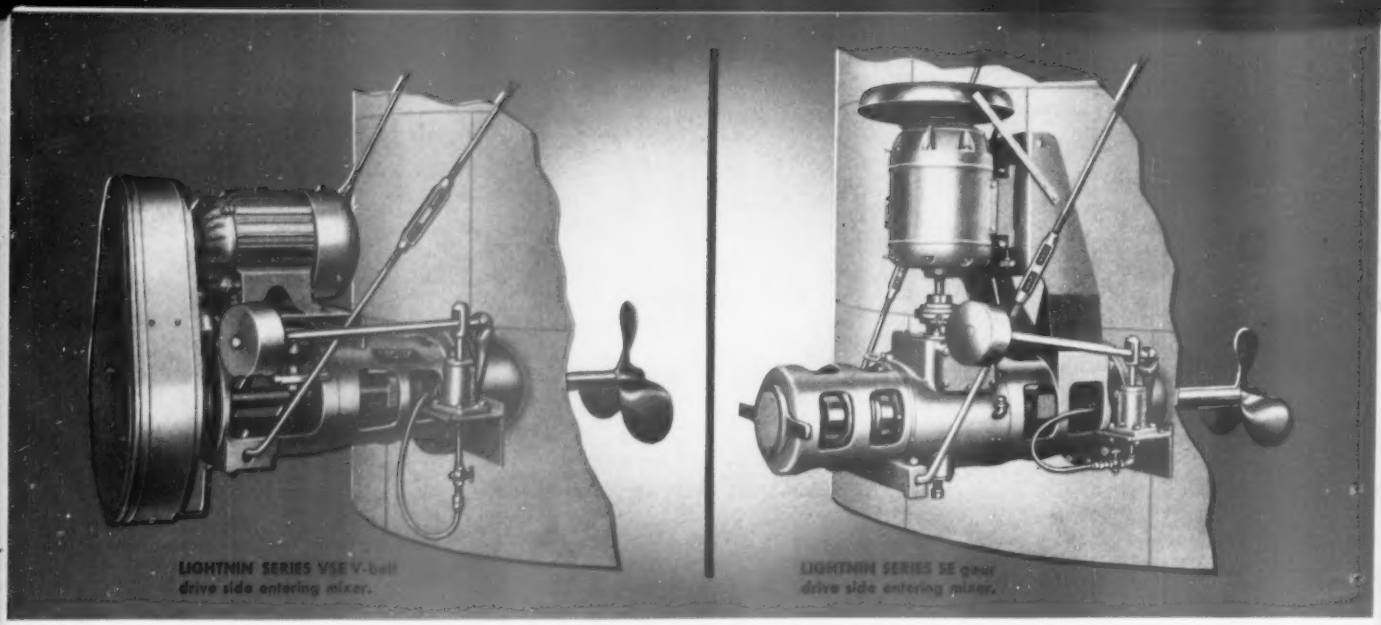
Similar Itemized Cost Indexes are published quarterly, and the Nelson Refinery Construction Cost Index appears in the first weekly issue each month on the Refining page.

Itemized Cost Indexes

(Multiply the 1946 prices of the Cost-imating Series by these Index Numbers divided by 100)

	1948	1949	1950	1951	1952	Mar. 1953	References*	Index for earlier years (The Oil and Gas Journal unless noted) Cost-imating
Labor:								
Skilled construction	125.0	133.9	140.0	148.3	157.9	163.8	Eng. News Record	No. 55—Nov. 3, 1949
Common labor	131.0	140.4	148.1	156.8	168.2	176.3	Eng. News Record	No. 55—Nov. 3, 1949
Refinery construction	128.0	137.1	144.0	152.5	163.1	170.0		No. 61—Dec. 15, 1949
Refinery operation	126.0	132.9	137.6	149.1	155.1	162.3	Sur. of Current Business	No. 55—Nov. 3, 1949
Equipment or materials:*								
Boilers, tanks and sheet metal	†140.0	†134.8	†136.0	†156.1	†153.4	†149.9	Code 10-72	April 21, 1952§
Boiler tubes, 2-2¼ in.	†135.0	140.9	149.5	163.3	168.8	173.8	Code 10-14-61	
Building materials (nonmetallic)	147.1	151.2	154.8	164.3	164.4	166.3	Code‡ 13	No. 22—Mar. 17, 1949
Brick—building	122.8	127.7	132.5	141.2	140.6	140.5	Code 13-41	No. 20—Mar. 3, 1949
Brick—fireclay	133.3	139.8	153.4	165.3	167.1	173.3	Code 13-42	
Castings (foundry products)	144.6	150.5	152.9	167.2	168.0	173.7	Code 10-15	No. 46—Sept. 1, 1949
Clay products (structural, etc.)	121.3	126.0	134.6	145.2	145.8	148.3	Code 13-4	No. 20—Mar. 3, 1949
Concrete—ingredients	119.4	123.7	125.3	132.7	132.7	133.6	Code 13-2	No. 22—Mar. 17, 1949
Concrete—products	118.9	121.7	124.4	132.8	132.6	133.0	Code 13-3	
Electrical machinery	127.6	130.9	134.9	154.3	152.4	151.7	Code‡ 11-7	See Marshall-S. (below)
Electrical motors and generators	128.6	128.7	135.0	155.8	154.6	153.5	Code‡ 11-73	No. 31—May 19, 1949
Electrical transformers, etc.	127.0	129.7	131.6	147.7	148.0	149.1	Code‡ 11-74	No. 31—May 19, 1949
Engines (composite)	116.9	124.8	126.0	146.1	146.5	146.2	Code‡ 11-54	No. 36—June 23, 1949
Exchangers	130.0	133.0	140.0	152.0	165.8	172.4	Manufacturer	No. 2—Oct. 28, 1948
Fans and blowers	131.3	152.2	162.9	190.1	183.7	180.8	Code 11-47	Feb. 17, 1949§
Hand tools	125.2	134.0	143.2	154.2	155.1	158.7	Code 10-42	
Instruments (composite	120.0	123.1	127.8	142.3	146.2	148.1	Manufacturer	No. 34—June 9, 1949
Flow meter (mechanical)		109.2	114.0	126.8	132.3	135.0	Manufacturer	No. 34—June 9, 1949
Flow meter (air control)		132.4	138.5	157.6	160.5	162.0	Manufacturer	No. 34—June 9, 1949
Flow meter (remote)		130.2	135.5	151.7	155.2	157.0	Manufacturer	No. 34—June 9, 1949
Potentiometer, 6-point		125.8	134.0	146.6	151.5	154.0	Manufacturer	No. 34—June 9, 1949
Potentiometer, air control		131.6	134.1	136.8	144.9	149.0	Manufacturer	No. 34—June 9, 1949
Pressure controller recorder		130.2	135.6	153.3	158.4	161.0	Manufacturer	No. 34—June 9, 1949
Pressure gage		100.0	101.2	108.6	108.6	108.6	Manufacturer	No. 34—June 9, 1949
Thermometer (recording)		118.6	124.0	144.3	149.4	152.0	Manufacturer	No. 34—June 9, 1949
Control Valve		129.8	133.3	155.5	155.5	155.5	Manufacturer	No. 34—June 9, 1949
Insulation materials	126.8	123.6	125.0	128.8	130.4	132.6	Code 13-72	
Lumber (composite)	181.0	165.3	193.0	208.5	203.2	203.8	Code 8-1	No. 7—Dec. 2, 1948
Lumber (Southern Pine)	174.3	157.7	176.9	189.1	191.2	193.2	Code 8-12	No. 7—Dec. 2, 1948
Lumber (other soft woods)	206.5	203.9	230.2	252.7	248.5	257.8	Code 8-13	
Machinery—general purposes	124.9	131.9	136.7	153.0	151.8	151.2	Code 11-4	Feb. 17, 1949§
Machinery—construction	127.8	136.0	140.1	155.3	157.5	159.4	Code 11-2	
Machinery—oil field	†125.9	†132.9	†135.8	†149.6	†149.9	†151.0	Code 11-51	
Paint and paint materials	143.0	141.2	136.9	153.9	151.9	149.9	Code 6-2	No. 22—Mar. 17, 1949
Paints—prepared	141.4	142.8	140.0	153.8	155.7	155.8	Code 6-21	
Pipe, sewer	†119.1	†119.3	†129.9	†147.1	†146.6	†146.2	Code 13-45	No. 22—Mar. 17, 1949
Pumps, air compressors, etc.	127.0	135.9	138.2	155.9	155.6	156.7	Code‡ 11-41	No. 29—May 5, 1949
Steel (iron and steel)	141.1	143.3	152.9	166.7	168.5	172.5	Code 10-1	No. 61—Dec. 15, 1949
Steel—finished steel	160.4	173.8	182.6	196.9	201.2	206.8	Code 10-14	
Steel—plate and sheet		(See boilers, tanks, etc., above)						
Valves and fittings	†125.9	†132.9	†135.8		†226.0	†226.3	Code‡ 11-49	No. 46—Sept. 1, 1949
Marshall-Stevens equipment (only) indexes:								
Process industries (average)	131.5	131.5	135.8	144.9	145.1	145.3	Chem. Eng. Mar. 1953	Chem. Eng. Feb. 1951
Chemical	130.0	130.0	133.8	142.5	142.8	142.8	Chem. Eng. Mar. 1953	Chem. Eng. Feb. 1951
Petroleum	132.0	132.0	136.5	145.6	146.0	146.2	Chem. Eng. Mar. 1953	Chem. Eng. Feb. 1951
Electrical power	135.0	135.0	139.3	148.3	148.7	148.9	Chem. Eng. Mar. 1953	Chem. Eng. Feb. 1951
Refrigeration	141.0	139.9	147.3	159.2	159.7	159.9	Chem. Eng. Mar. 1953	Chem. Eng. Feb. 1951
Steam power	132.0	132.0	136.6	146.5	147.0	147.2	Chem. Eng. Mar. 1953	Chem. Eng. Feb. 1951
Nelson Refinery Construction	132.5	139.6	146.2	157.2	163.6	169.1		No. 61—Dec. 15, 1949

*Code refers to the revised index code number of the Bureau of Labor Statistics, U. S. Department of Labor, "Wholesale Prices." †Estimated base value for 1946. ‡Not exactly the same items as those published before July 7, 1952. §Questions on Technology, The Oil and Gas Journal.



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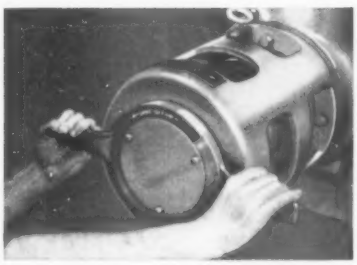

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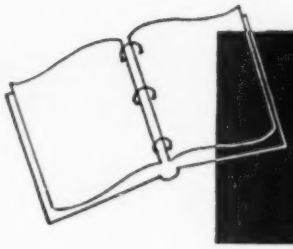

REFINER'S NOTEBOOK

PETROLEUM PRODUCTS

Minimizing Heating-Oil Instability

STRAIGHTRUN gas oils are now being used as charging stocks for catalytic cracking in order to produce higher yields of high octane gasoline, with a consequent shrinkage in volume of straightrun distillates available for diesel fuels and domestic heating oils. Refiners, finding it expedient to utilize cracked gas oils in heating oils to supplement their short supply of straightrun stocks have been encountering problems concerning the instability and incompatibility characteristics of these cracked stocks even though combustion efficiency and heating values are at least as good or even improved. They find that catalytically cracked oils, generally, are much less stable in storage than are straightrun oils, and that this instability manifests itself in the formation of excessive quantities of a gummy deposit. Furthermore, blending such cracked stocks with stable straightrun gas oils often results in the acceleration of the rate of gum deposition due to their incompatibility.

In diesel fuels, the problem of fuel filter plugging is not as serious because these are usually serviced on a routine basis. However, gummy fuels are apt to cause frequent injector sticking, as well as impairment of the fuel spray patterns, which causes excessive smoking from the exhaust stacks.

Mechanism of Deposit Formation

Middle distillates consist primarily of paraffins, naphthenes, and aromatics. These hydrocarbons themselves are relatively stable to storage and do not contribute substantially to deposit formation. However, a relatively small percentage of the compounds in furnace oils contain oxygen, nitrogen and sulfur in addition to carbon and hydrogen. These compounds are usually more reactive than hydrocarbons. They will react with oxygen, and after being oxidized may coalesce to form aggregates which are insoluble in the oil. When first formed, these particles are exceedingly small, too small to plug the opening of a screen or a burner nozzle. In time, however, these precipitates coagulate to form gum particles large enough to plug such openings.

From material furnished by Oronite Chemical Co.

Effect of water . . . When water is present in the burner system, which is the case more often than not, the rate of deposition of gum particles increases markedly. The effect of water may be demonstrated by shaking a sample of furnace oil with water and observing the scum that forms at the interface between the oil and water layers. This phenomenon, in fact, is the basis for the rapid test procedure which will be given in the next installment and which is suggested as one means for evaluating the gum-forming tendency of a furnace oil.

In addition, trace quantities of water are often sufficient to cause excessive rusting of iron storage tanks, pipe lines, and other iron surfaces in burner installations. Filter plugging sometimes arises from the rust so formed.

Inhibitor

One domestic furnace-oil inhibitor consists of a 40 per cent concentrate of a synthetic surface-active chemical in a solvent mixture of isopropyl alcohol and a petroleum distillate. The active ingredient is a chemical invented and synthesized especially for use in furnace oils. This is intended to inhibit gum formation in distillate fuel oils on aging, to suspend gums already formed in a fine state of dispersion, and to prevent the rusting of iron surfaces in contact with the fuel. The concentrate is a light colored, low viscosity liquid which maintains both stability of solution and effectiveness upon prolonged storage. When added at the rate of 1 pt. per 1,000 gal. of furnace oil, the concentration of active ingredient is 50 p.p.m. Typical inspections are as follows:

TYPICAL TESTS

Active ingredient, per cent by wt.	41.1
Inert ingredients, (hydrocarbons and isopropanol), per cent by wt.	58.9
Viscosity at 100° F., S.s.U.	55.8
Gravity, °A.P.I.	24.1
Freeze out after 24 hr. at —20° F.	None
Color, A.S.T.M.	1—
Appearance	Bright
Weight, pounds per gallon	7.57

Inhibitor Action

Primary function of the inhibitor is to prevent the coalescing of the gums that precipitate from furnace oil upon storage, thereby preventing the formation of large aggregates which stick to filter elements and plug burner nozzles. In addition to this effect, the inhibitor also reduces the actual rate of formation of insoluble gum. The resulting reduction in screen and filter deposition has amounted to as much as 40 per cent to 50 per cent or more in full-scale laboratory pumping tests and in actual domestic burner installations in the field where the additive has been used.

Combination treatment . . . In some cases, however, an oil may be so highly gum-forming that it is not feasible to correct the gum-forming tendencies of the oil with the inhibitor alone. The inclusion of large percentages of some raw catalytic cracked stocks in distillate fuels, for example, so markedly increases the tendencies of these fuels to plug filters and screens that treatments such as caustic contacting or acid treatment followed by caustic neutralization may be required to stabilize the blends.

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Anode-Bed Inspection and Maintenance

by Marshall E. Parker*

PERIODIC inspection of an installed cathodic protection system may at some time disclose a decrease in the current output, as being responsible for a total or partial loss of protection. This can happen either to rectifier systems or to those using magnesium anodes, and part of the technique for locating the trouble is applicable to either type.

If the current has fallen to zero, then the obvious first check should be on the rectifier itself. If, however, its output voltage is correct, or high, then the trouble lies somewhere in the connections. First, the voltage between the **negative** terminal and the pipe itself should be checked, using a temporary contact to the pipe or to some valve or riser connected thereto. This voltage should be zero under the assumed conditions; if it is substantial, then the open circuit is between the unit and the pipe, and excavation will probably be required for its repair. If the lead from rectifier to pipe is long, it may be worth while to excavate at or near its midpoint for a check; certainly it would be advisable to excavate at any point where recent construction or excavation may have damaged the cable. In the absence of any such activity, the most probable location of the opening is at the pipe connection.

When a magnesium anode group either shows zero current output, or shows a pipe-to-soil potential so low as to indicate it, a connecting wire should be exposed at the most easily accessible point. Where the leads have been placed in or on markers, these should be used. A potential reading between the wire thus exposed and a copper sulfate electrode will quickly show whether the wire is connected to pipe or to magnesium (the latter usually shows a potential of about 1.4 - 1.6 volts). This will indicate the direction in which to proceed in excavating and checking leads; at each point, the same test will indicate the connection of the wire, and eventually the break can be found and repaired.

When the current output of either a rectifier unit or an anode group is not zero, but lower than anticipated, there are two distinct possibilities; there may be a break in the connections, so that one or more anodes are disconnected; or there may have been progressive increase in anode resistance or progressive consumption of anode material. The best evidence for the separation of these two types of failure is the slowness or suddenness with which the protection was lost; and it is in a situation of this kind that very frequent inspection or semicontinuous monitoring of potentials at a few critical points pays off.

Sudden drop in current output (if not due to stack failure in a rectifier) is almost always due to a broken or corroded connection.

This consists of conducting a surface potential survey over the anode group. The copper sulfate electrode is placed over each anode (if the locations are known) and at the midpoints between anodes. It is well to take two or three readings beyond each end of the group, also. For all of these readings, the reference connection remains fixed; it may be the pipe itself, or one of the leads in the circuit; or a driven ground rod may be used.

The potentials may be taken either with a potentiometer or with a high-resistance voltmeter; the latter will probably have to be used on rectifier anode beds, as the readings will be outside the range of most potentiometers. The technique is applicable to either type of anode, the difference being largely in the magnitude of the values obtained.

If all of the anodes are functioning properly, there will be a peak over each one, with a sag between anodes, and a rapid falling off when the end of the row is reached. A single inactive anode will show up as a longer and deeper sag between two which are working. If the main cable is severed, so that several anodes are inactive at the end of the group, there will be no peaks at all associated with them. If the locations of the anodes are not accurately recorded, it will be necessary to take a larger number of readings at closer spacing, and plot the entire row; the approximate anode locations (of those which are active) will then be apparent.

Another method of locating inactive anodes consists of opening the circuit between the anode group and the pipe line (removing the rectifier from the circuit) and connecting a pipe locater transmitter between the pipe and anode group. There will then be a strong signal along every part of the cable which is carrying the current; if there is a break in the main cable, the signal will die at last connected anode.

This method is very rapid, but it may miss a single disconnected anode in the middle of a row, since it does not give a very strong indication of the anodes themselves, but responds largely to the current in the cable. Sometimes this method can be used without a transmitter, by following the a.c. hum of an operating rectifier.

Since the current distribution between anodes is often quite unequal, the interpretation of the surface potential survey is made much easier if a similar survey is on record, having been made while the system is known to be performing adequately. Otherwise variations in soil resistivity and anode resistance may produce some confusing irregularities. However, even with great variations, there will still be a definite peak over each anode which is discharging current to earth, and failure to locate such a peak at the location of an anode is sure evidence of its failure.

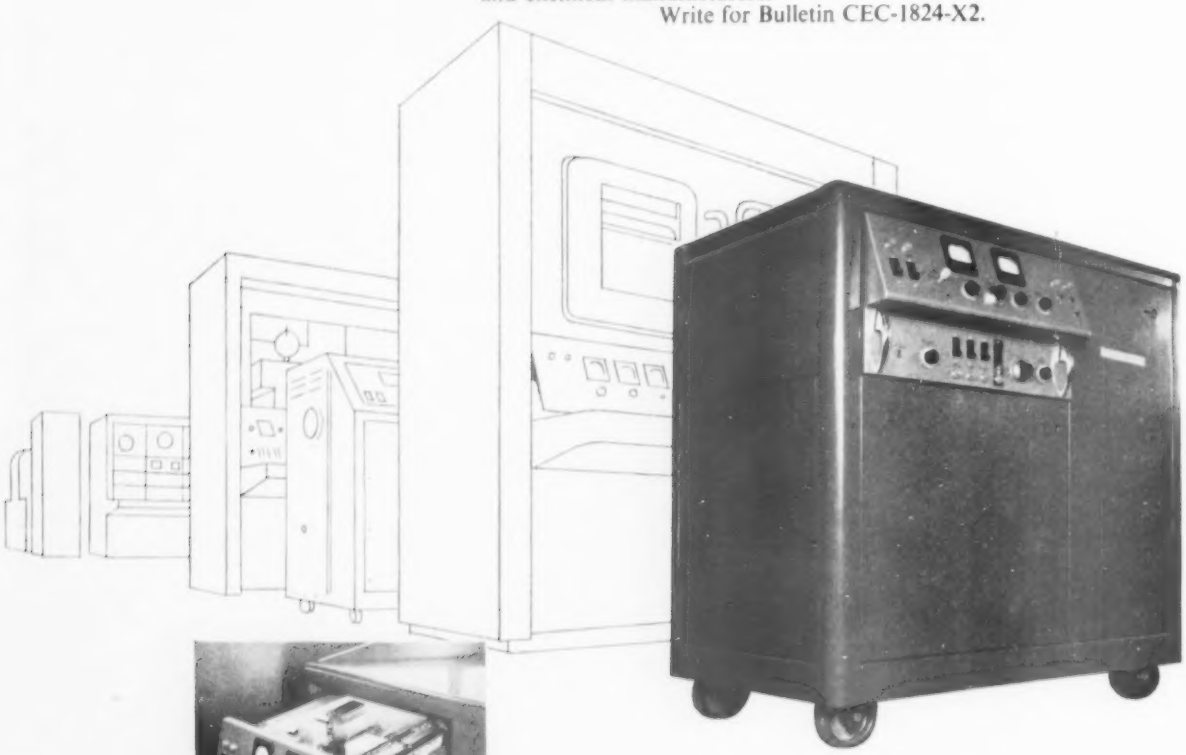
* Houston consultant.

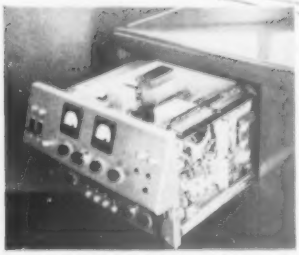
Newest in the line . . .

A single instrument for
Process control
Leak detection
Research

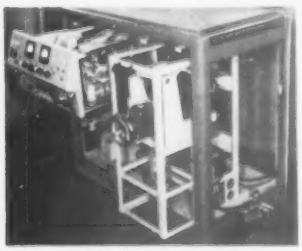
THE latest mass spectrometer in America's accepted standard line is the Consolidated Model 21-610, a precision electronic instrument with extreme stability for unattended process monitoring in the petro-chemical industries. Used with a hand-held probe it operates as a detector for tracing leaks of any gas within its mass range. The Model 21-610 is suitable for qualitative and quantitative component determinations in gaseous and light-liquid mixtures. Moderately priced and economical to operate, needing no expensive refrigerants, this new instrument brings mass spectrometry as a control procedure within reach of small refineries and chemical manufacturers.

Write for Bulletin CEC-1824-X2.





All components are accessible: either by removing side panels or by pull-out chassis containing circuits and controls.



Electronic and vacuum/analyzer assemblies may be removed intact and operated independently.

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Consolidated Engineering

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analytical instruments for science and industry

Test Results . . . Globe Bodies

by G. F. Brockett* and C. F. King*

IN making tests for flashing liquids through control valves preliminary tests indicated that flow through globe-style bodies did not follow the same laws as angle bodies. Consequently, they will be treated separately in this paper.

Globe Bodies

The results of a typical series of tests are illustrated in Fig. 1. The test valve was a 2-in. double ported globe type, equipped with a plug-style inner valve. The inner valve was positioned at maximum lift, and the port area was approximately 90 per cent of 2-in. pipe area. One hundred psia. pressure was maintained at the inlet to the test valve throughout the tests.

In Fig. 1, rate of flow is designated on the abscissa and pressure drop on the ordinate. Note that the coordinates are logarithmic. Each curve represents a test run at constant temperature at the valve inlet. The storage tank temperatures are marked on the curve. Saturation temperature for water at 100 psia. pressure is 327° F. As long as the temperature was maintained below 327° F. in the tank, and the pressure never went below 100 psia., the water remained in the liquid state up to the inlet of the test valve, and the water temperature remained substantially constant between the test valve and the storage tank. Consequently, the temperatures on the curve to the right of the one marked 327° F. are valve inlet temperatures, as well as storage tank temperatures.

The curves to the left of the one marked 327° F. were plotted from tests with a mixture of steam and water in the test line between the upstream hand valve and the test valve. Consequently, the temperature at the inlet of the test valve, being dependent on the 100 psia. pressure, remained at 327° F., regardless of the storage tank temperature.

The curve at the extreme left in Fig. 1 shows results of a test run with saturated steam at the test valve inlet and is shown here to complete the illustration of the flow rate vs. pressure drop relationship for water in its various states.

It is interesting to note that in spite of the general belief to the contrary, these flow curves indicate an apparent critical pressure ratio with liquid flow. The numerical value of this ratio varies with inlet temperature, but in every case where inlet temperature is below saturation (327° F.) it occurs at outlet pressures above saturation or with the water still in the liquid state.

Tests of 1, 1½, 2, 2½, and 3-in. globe-style control valves in both single and double ported construction and equipped with V-port and plug-style inner valves all yielded similar curves. These tests were run with 50, 100, and 200 psia. inlet pressure.

The fundamental law of fluid flow commonly used by engineers in determining the capacity of control valves for liquid flow is:

$$Q = C_v (\Delta p/G)^{1/2}$$

Where:

- Q = quantity flowing in gallons per minute
- C_v = capacity of the valve with 1-lb. pressure drop in gallons per minute
- Δp = pressure drop from inlet to outlet of the valve in psi.
- G = specific gravity of the flowing liquid

The straight diagonal line at the right of the family of curves in Fig. 1 follow this hydraulic formula. Note, however, that even with relatively cold 80° F. water, at a pressure differential of 75 psi., the rate of flow no longer increased with increasing pressure drop and the formula no longer applies. At 320° F. and 100 psia. inlet pressure, the maximum flow is reached at approximately 12 psi. differential. These tests certainly indicate that serious errors can result from using the conventional hydraulic formula in sizing control valves handling warm or hot water.

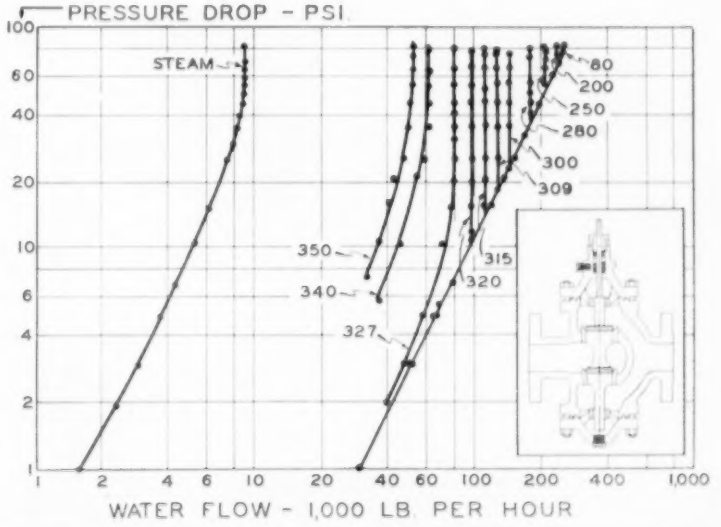
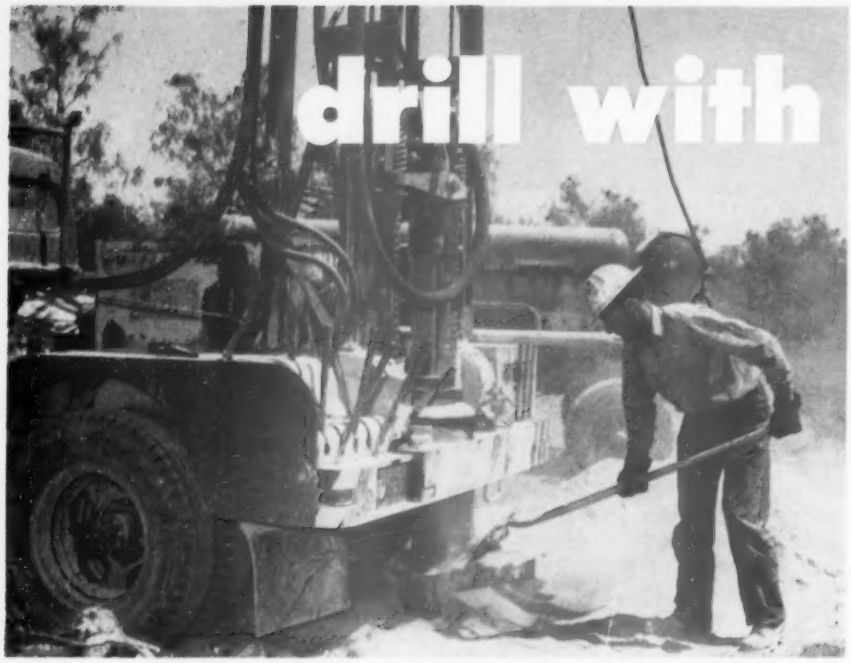


Fig. 1—Capacity curves for 2-in. globe-body throttle-plug valve; inlet pressure, 100 psia.

*Fisher Governor Co. Presented at Symposium on Instrumentation, A. & M. College of Texas, 1953.



Air drilling in West Texas with the new TI Shot Hole Rig.

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use TI's versatile Shot Hole Rig!

IN WATER-SCARCE AREAS, air drilling with TI's versatile, portable Shot Hole Rig is solving the tough problem of thirsty formations. Drilling with air—and TI's new drill—removes the cuttings from the hole quickly and economically.

And whatever the area—dusty *or* damp—the sealed-unit construction of the new INTEGRATED POWER DRIVE protects the machinery. Gears, chains, clutches, and other moving parts are completely sealed in a single case and continuously spray-lubricated with *filtered* oil.

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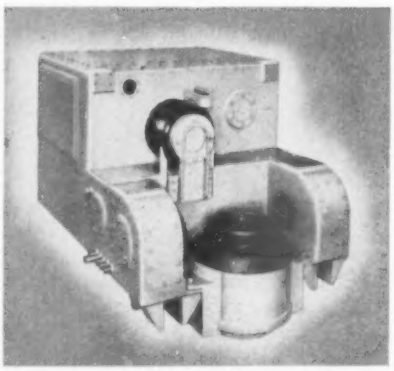

NEW INTEGRATED POWER DRIVE

Long life and low maintenance costs are inherent in the sealed-unit construction of the INTEGRATED POWER DRIVE, heart of the TI drill. All the components necessary for the transfer and control of power have been brought together in a *single* case with centrally located controls. Rotary table, pull down drive, kelly hoist, hoist drum, and pump drive are so integrated with the primary power drive that transfer of power for *all* drilling operations is accomplished in a *single sealed unit.*

EQUIPMENT MEN . . . in the News

Weatherford Names Three Division Managers

Weatherford Oil Tool Co., Inc., sales personnel gather at the Shamrock for recent annual sales conference. Front row: Fred Vaughn, John Ekey, Fred Wright, Jules Moritz, Lee Martin, Bob Hume, J. E. Hall, Jr., Elmer D. Hall, Jimmy Smith, Elwood Hamilton, Al Smith. Back row: Weldon Martin, James Bradley, Ray Ferguson, Bob Wood, "Pop" Waldrop, Lloyd Jackson, Fendal Wright, Todd Antrim, Lee Mooty, Jack Humphrey, Clyde Baumgardner, Nick Rogers, Charles Durkee, Gene Smith, Oran Brooks, Claude Bodin, Dave Lorenz.

R. H. HUME

Following a recent sales conference held at the Shamrock Hotel in Houston, Weatherford Oil Tool Co., through its president, Jess E. Hall, Jr., announced the appointment of three new division managers. The domestic area has been divided into three divisions each respectively known as the Southern, the Northern, and Central divisions.

Named to head the Southern division, extending through Houston, Beaumont, Victoria, Corpus Christi, and California was Robert H. Hume who has been with Weatherford a number of years. Prior to that Hume spent 12 years as superintendent of operations in the Venezuela area for Sinclair Oil Co. He has aided in the organization of the district office operations, in the various cities over which he will assume managership.

LEE MARTIN

R. ROGERS

The Central division is made up of the New Mexico, Odessa, Abilene, Nocona, and Wichita Falls districts over to Shreveport, La., and will be handled by Lee Martin, who has also served the Weatherford organization for a number of years. His background extends through the oil industry from rig floor up.

Northern division extends from Ardmore, Okla., through Tulsa and Casper, Wyo., as well as Great Bend, Kans., and ends in Glendive, Mont. R. (Nick) Rogers has been chosen for the position of division manager for this section which he has been developing through the various districts.

All three new division managers begin active operation of their respective posts immediately.

T. D. Williamson Appoints P. H. Moore in Natal

P. H. MOORE

T. D. Williamson, Inc., Tulsa, manufacturers of pipe-line tools, has announced the appointment of Philip H. Moore, Albany House, Esplanade, Durban, Natal, as sales and service representative for Southern Africa. Moore is a graduate in oil engineering and refining at University of Birmingham, England. He spent 5 years as chemical engineer with Manchester Oil Refinery, Ltd. In 1941, he and James Barrett, as partners, acted as consulting chemical engineers and petroleum technologists. He moved to New York in 1948, where he was engaged in giving technical assistance to European companies. In 1950 Moore became a resident of Durban, South Africa, where he is now acting as consulting engineer and agent.

Brewster Co. Names New Field Representative

Appointment of Lester Click and J. D. Harrison as new field-service representatives of The Brewster Co., Inc., of Shreveport, La., has been announced by B. E. Wilder, service manager.

Harrison will represent Brewster in Montana, Northwest Canada, Wyoming, Utah, North Dakota, and South Dakota. He will have offices at Mayhew Supply Co. in Sidney, Mont. Mayhew is the supplier of Brewster equipment and parts in the Sidney area. Click will represent Brewster in West Texas and Mexico. He may be contacted in Odessa at Bovaird Supply Co., Brewster supplier in the Odessa area.

LESTER CLICK

J. D. HARRISON

Oostermeyer Added to Fluor Board of Directors

OOSTERMEYER

Jan Oostermeyer, former president of Shell Chemical Corp., has been elected to the board of directors of Fluor Corp., Ltd., Los Angeles, bringing the number of board members to 10, it has been announced by J. S. Fluor, president of the engineering, manufacturing, and construction firm.

Oostermeyer's retirement from Shell was announced June 1. He began his oil-industry career in 1917 with Asiatic Petroleum Co. in China. He spent 20 years in the Orient before taking up new duties as assistant manager for Shell at Santiago, Chile, in 1937.

In 1939 he became assistant to the president of what was then Shell Chemical Co. He was named vice president

Photo courtesy Chain Belt Company, Milwaukee, Wisconsin

Chrysler Power and gýrol Fluid Coupling help remove work and jerk from transit-mixing . . .

Chrysler Industrial Power pumps water, digs ditches, harvests grain, cuts lumber and . . . mixes cement. And very well too. Construction people claim the mixing action of this seven-yard truck mixer is extremely efficient and its charging and discharging speeds excellent, even with coarse mix.

From its position at the rear of the Rex Roto-Mixer, the 230 cubic inch displacement Model 6 Chrysler Industrial Engine supplies ample power for the mixing mechanism. At the same time, Chrysler gýrol Fluid Coupling protects mixer, engine, clutch and transmission from the life-shortening wear imposed by the combination of heavy payloads, sudden starts and stops. Prevents stalling too.

This is simply Chrysler Industrial Power doing a specialized job *better* because the engine was selected and equipped to meet the requirements of this particular job. The manufacturer—like every other—chose from a great number of Chrysler options. Among them: gasoline, natural gas or liquid-propane burning carburetors, 3, 4 or 5 speed transmission, standard or gear-driven front ends (with magneto or hydraulic pump drive), twelve or twenty-four volt electrical systems.

Chrysler offers ten power-proved industrial engines for your consideration. They are not expensive because Chrysler production-line methods allow us to mass-produce custom-built engines and sell them at mass-production prices. See the nearest Chrysler Industrial Engine Dealer for complete details, or write: ***Dept. 157, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

CHRYSLER
Industrial Engines

HORSEPOWER WITH A PEDIGREE

a year later, and advanced to the presidency in 1942.

The firm was absorbed as the chemical division of Shell Union Oil Corp. in 1943, and Oostermeyer became executive vice president. Shell Chemical Corp. was recreated in 1946 as a separate and autonomous concern, with Oostermeyer as president.

McEvoy Transfers Ites to Houma, La.

Barney E. Ites, representative for McEvoy Co. of Houston, has recently been transferred to Houma, La., where he will make his headquarters, aiding oil-company personnel in the problems dealing with high-pressure valves and well-head equipment.

His territory will be southern Louisianna, east of the Atchafalaya River. Ites has been associated with McEvoy for the past 12 years, working out of the Houston office as a special trouble shooter, and is well known throughout the Gulf Coast area.

Whatley to Manage Oilwell Store in Gainesville, Texas

Appointment of D. L. Whatley as manager of the new store opened at Gainesville, Tex., by the Oil Well Supply Division of U. S. Steel has been announced by V. J. Waters, manager of the Central Midwest area.

Whatley began work for Oilwell in March 1948. Prior to his appointment as Gainesville store manager, he served as Oilwell field representative at Wichita Falls, Tex.

Cwik Named by B.S.&B. to Chicago District Sales

DICK CWIK

Lawton L. Laurence, manager oilfield sales, and Jimmy Dvoracek, manager controls, safety head, and venting-equipment sales, Black, Sivalls & Bryson, Inc., have announced the appointment of Dick Cwik as Chicago district sales manager for both sales divisions.

Cwik has been with B.S.&B. for the past 5 years as a salesman, and as a city sales manager. Black, Sivalls & Bryson, Inc., has completed over 60 years as a manufacturer of oil-field equipment.

Continental Changes Staff

The following changes in personnel have been announced by The Continental Supply Co. Oliver C. Davis, who has been store manager at Artesia, Colo., has been named as city sales representative in Billings, Mont. Edward Cajthaml, former field salesman in Casper, Wyo., has taken over the duties as Artesia store manager, while Ross E. Prowell of the Casper store has taken over Catjthaml's former duties.

Sperry-Sun Holds Annual Sales Meeting

Sperry-Sun Well Surveying Co. recently called in its salesmen from all active areas in the United States and Canada for its annual sales meeting in Houston. S. H. Williston, Sperry-Sun vice president; A. B. Palmer general manager, and W. F. Krueger, general sales manager, conducted the meeting. Sperry-Sun men at the meeting were: Top row, W. F. Krueger, H. A. Wesner, R. R. Ring, Q. B. Marsh, R. R. Blakeley, V. L Gross, S. H. Williston, R. D. Warden, A. J. Goolsbee. Middle row, J. B. Peddy, B. A. Cabaniss, H M. Lowe, F. S. Kielman, J. D. Cooper, K. C Clark, A B. Palmer. Bottom row, R. E. Keyes, C. C. Littlefield, E. J. Blackburn, C. E. Hawk, H. J. James, K. O. Robison, A. P Ortolon

HAS A BRAKE THAT REALLY HOLDS IN TOUGH TOWING WORK

THE BRAKE on an oil field and pipeline winch is important. That's why it's worth knowing that the brake of the Carco GO winch really works. In over three years of field use there has never been a single service complaint. The Carco GO winch brake is automatic. You can set the brake before winching in a load and it takes effect the moment clutch is released. There's no load drop or slip-back. The Carco GO brake gives smooth control over the load, longer lining life and will hold a total load even heavier than can be winched in to the tractor. Remember, the Carco GO winch was designed for oil field and pipeline work. It's a two-speed winch with large drum capacity and high line pull. Roller type fairlead is easily attached. See your nearest Carco dealer. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Oregon, and Franklin Park, Illinois.

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NATURAL GAS

Gas Fight Renewed

FPC to reopen hearing on disputed northeast area

WASHINGTON. — Oral arguments will be held July 9 in the Federal Power Commission proceedings involving competitive applications to serve the New England natural-gas market filed by Algonquin Gas Transmission Co., Boston, and Northeastern Gas Transmission Co., Springfield, Mass.

The FPC gave Algonquin exclusive permission in February 1951 to serve the disputed areas, which compose one-half of a four-state New England area. Northeastern, which had been granted earlier the right to serve the other half of the New England territory, took the case to court on grounds the company was not given a full FPC hearing. The appellate court ruled for Northeastern and ordered FPC to reopen the hearings *(The Oil and Gas Journal, October 20, 1952, page 88).*

Northeastern has argued that the commission should explain why it deterred from its policy of granting one company permission to serve one area. On the other hand Algonquin has contended the delay is costing the company approximately $200,000 per month in fixed charges and other expenses. Algonquin had nearly completed a transmission line in the contested area when the appellate court order stopped construction.

The hearings were reopened November 25 and have been in almost continuous session since. Recently the FPC granted a motion by Algonquin and its supplier, Texas Eastern Transmission Corp., to omit intermediate-decision procedure. However, at the same time the commission denied a motion by Iroquois Gas Corp., United Natural Gas Co., and Pennsylvania Gas Co., affiliated interveners in the proceedings, the sever their cases from the consolidated proceedings. These cases involve a proposal by Tennessee Gas Transmission Co., Northeastern's supplier, to transport gas for delivery to Iroquois.

Gulf Sulfur Unit Produces 12,750,000 Lb. First Year

WADDELL, Tex.—Gulf Oil Corp.'s new sulfur-recovery unit here has produced 12,750,000 lb. of sulfur during its first year of operation, and has enabled the company to completely utilize casing-head gas.

Put into service June 12, 1952, as an addition to the company's natural-gasoline plant here, the unit has a capacity of 44,000 lb. daily and recovers approximately 90 per cent of the elemental sulfur contained in gas coming into the plant.

Prior to construction of the unit, the only portion of casing-head gas not used by the gasoline plant was acid gas which was removed from the main stream by desulfurizing. The resulting sulfurous gas was burned off in flares.

In addition, the facility is the first in West Texas able to deliver sulfur in hot, molten form direct by truck to the purchaser. The unit's entire production is being purchased by a fertilizer and chemical manufacturer at Odessa, Tex., 20 miles from Waddell. The product is loaded at 255° F. to 265° F. and drops in temperature only 1° an hour. Therefore, since the sulfur does not solidify above 230° F., it can be delivered as a liquid.

Sunray Begins Gas Deliveries From Texas Coastal Fields

CORPUS CHRISTI, Tex.—Sunray Oil Corp. has started gas deliveries to pipe-line customers from Mustang Island and Red Fish Bay fields in Nueces County, Texas, by use of low-temperature extraction equipment.

The two fields, which lie about 3 to 3½ miles south-southeast of Aransas Pass and extend nearly 10 miles in a southerly direction in inland bay waters, have been divided into four units where the low-temperature extraction equipment is being installed to handle gas and distillate from the fields. One of the units is presently delivering about 8,000,000 cu. ft. daily to United Gas Pipe Line Co.

When all the units are completed in August, the company will be able to deliver about 40,000,000 cu. ft. per day from the two fields. The fields yield an average of 20 to 25 bbl. of distillate per million cubic feet of gas.

Besides its own production, Sunray will handle gas-distillate production for seven other producing companies in the area.

FPC Reports Gas-Company April Revenues Increase

WASHINGTON. — Operating revenues of natural-gas companies totaled $205,067,212 in April to show an increase of 22.5 per cent over April 1952, according to reports received by the Federal Power Commission.

For the 12 months ending April 30 revenues were $2,090,074,650, as compared to $1,754,379,097 the preceding 12-month period, up 12.1 per cent.

Gas sales to ultimate consumers during the month were 243,569,000,000 cu. ft., an increase of 6.3 per cent over April 1952.

Decreases in sales to residential and commercial consumers of 0.9 per cent and 2 per cent, respectively, was registered while industrial consumer sales rose 11.8 per cent. Revenues from the three classes of service increased 7.7 per cent, 6.7 per cent, and 22.9 per cent, respectively. Revenues from all sales to ultimate consumers increased 12.7 per cent, and amounted to $93,441,779.

Net income of the companies for April 1953 was $23,621,101, up 3.2 per cent over the same month last year. For the 12-month period a net income of $215,206,149 represented a rise of 5.1 per cent over the $204,790,911 reported for the comparable period April 30, 1952.

Carthage Hydrocol to Reopen Brownsville Synthetic Plant

BROWNSVILLE, Tex. — Carthage Hydrocol will reopen its plant here as soon as needed repairs are made, Guy Gabrielson, former Republican national chairman, and president of the company, revealed in New York last week.

The plant was closed "indefinitely" because additional equipment is needed to obtain capacity output *(The Oil and Gas Journal, June 29, 1953, page 44).*

The $40,000,000 project, which produces gasoline and chemicals from natural gas, was financed for an estimated $30,000,000 by the Reconstruction Finance Corp.

Gabrielson said he did not know how long the plant would be closed down but the firm planned to rush work along as fast as possible.

"If we had all the equipment on hand," he said, "it would take about 3 months to install."

Natural gas is piped 63 miles to the plant from San Salvador fields south of Weslaco and LaBlanca, Tex.

The plant was designed to produce about 6,000 bbl. daily of synthetic gasoline, 900 bbl. of gas oil, 200 bbl. of fuel oil, and 300,000 lb. of water-soluble oxygenated chemicals.

Design calls for processing of a feed of 90,000,000 cu. ft. of natural gas daily, plus use of about 280,000 cu. ft. of air to produce the oxygen necessary for the synthesis process.

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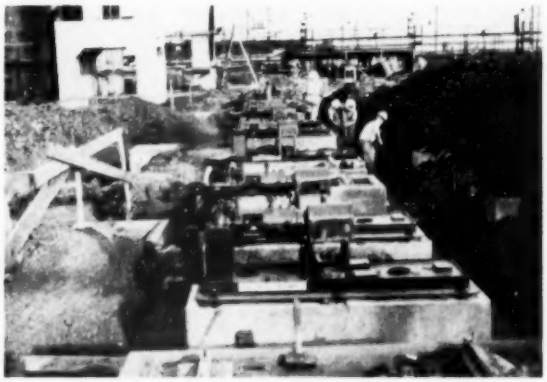
The requirements for your specific service having been made known by your engineering specifications you will look carefully into the benefits offered by the various bidders. After looking, it's dollars to doughnuts your requisition will specify *"Pumps by Pacific"* because of the greater benefits of Pacific's *double assurance.*

Assurance **that Pacific's design, workmanship and materials will fit the requirements of your specific service.**

Assurance **that Pacific's dependable fast service will fit your needs.**

Whether shipped by Air...Rail or Motor Freight...

Pacific Pumps and parts will be on the job early



Order recieved November 2 for 2 chrome steel impellers with heat-treated and hardened wearing rings—Parts shipped November 6

Order received 10:30 a.m. Wednesday for a Pacific multi-stage rotor—Rotor shipped 8 a.m. Friday, 46½ hours later

CP-8

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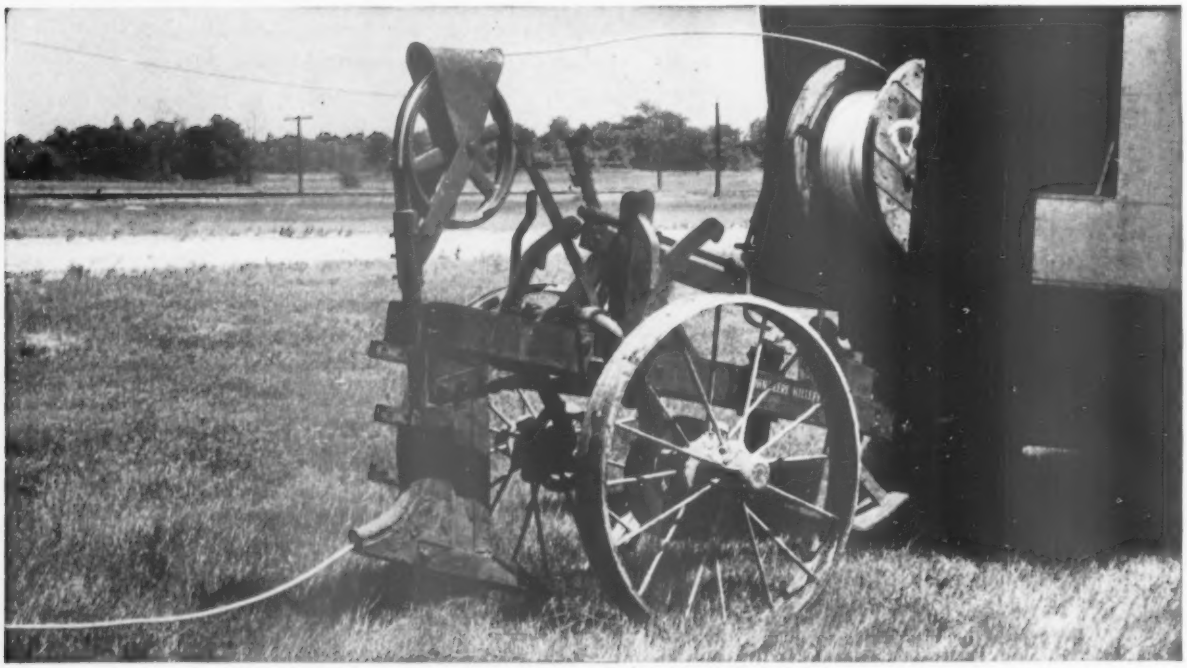
Dow's Magnesium ribbon anode saves time and labor in installation



Galvo-Line is installed by wire-laying plow drawn by truck or tractor.

Has the high cost of anode installation discouraged you from using this most efficient method of pipeline protection? Then investigate Galvo-Line®, Dow's flexible cored, magnesium ribbon anode.

Time and labor are the big elements of cost in any anode installation. By providing a simplified method, these factors can be cut to the bone with Galvo-Line.

Up to *five miles of pipeline per day* can be protected by plowing in Galvo-Line. The installation is also simplified by the fact that the number of connections to the pipeline can be considerably reduced. Intervals of 500 to 1000 feet are generally adequate.

Galvo-Line cuts costs another way, too. It provides from three to seven times as much current per pound of magnesium installed as conventional magnesium anodes. More uniform distribution and efficient utilization of current make Galvo-Line both economical and dependable for pipeline protection.

When you plan your next protection program, figure it *two ways* . . . one with Galvo-Line. Let the facts prove themselves.

Call your nearest Dow office or Dow distributor for complete data. THE DOW CHEMICAL COMPANY, *Magnesium Department*, Midland, Michigan.

you can depend on DOW MAGNESIUM ANODES

DOW

PIPE LINES

Competitors Join

Conoco, Carter, others to lay Billings-Spokane line

BILLINGS, Mont.—A 600-mile, 10-in. products line from Billings to Spokane will be built in the near future as a joint venture of Continental Oil Co., Carter Oil Co., and other interests, according to well-founded reports here.

It is understood that Carter and Continental will hold principal interest in the project, with W. Turner Clack, a major independent distributor of Spokane, and possibly Union Oil Co. of California, also participating. Together with the 20,000 bbl. per day products line, it is expected that Carter will expand its Billings refinery, which now has a crude-charge capacity of 22,000 bbl. daily. Also, Continental has a refinery at Billings which has a daily crude-charge capacity of 8,889 bbl.

Former competitors . . . Plans for a products line connecting the Billings refining area with the Spokane marketing area have been under consideration for some time. Continental was first to announce its plans to construct an 8-in. line from Billings through Bozeman, Helena, Missoula, and Thompson Falls, Mont., and across the northern part of the Idaho Panhandle to Spokane. Ultimate capacity of the line had been placed at 25,000 bbl. daily *(The Oil and Gas Journal, November 10, 1952, page 183).*

A few weeks later a new firm, Inland Empire, headed by Clack, announced it would build an 8 and 10-in. line by the same route *(The Oil and Gas Journal, January 5, page 32).* Initially, plans called for the line to have a capacity of 15,000 bbl. daily with an ultimate capacity of 26,000 bbl. per day.

Inland planned to construct intermediate terminals at Bozeman, Helena, and Missoula, Mont., and Kellogg, Idaho *(The Oil and Gas Journal, January 26, page 180).* It is not known if these terminals will be built on the newly proposed line.

Line from Salt Lake . . . Salt Lake Pipe Line Co., a Standard Oil Co. of California subsidiary, has started construction on another 8-in. products line to Spokane. This one will run from Pasco, Wash., and have an initial capacity of some 12,000 bbl. daily. Also, the company is presently building a $4,500,000 terminus in Spokane. The entire project is expected to be completed by September 15.

Permian Pushes Work on Three Permanent Stations

MIDLAND, Tex. — Permian Basin Pipe Line Co. is pushing construction of three permanent compressor stations

Barge Readied for 369-Mile Haul

One of the last of 95 barges hauling 42,000 tons of 20-in. line pipe from Greens Bayou near Houston to Harvey, La., takes aboard a 500-ton cargo. The pipe is being delivered 369 miles via the Houston Ship Channel and the Intercoastal Canal of the Gulf of Mexico to Southern Natural Gas Co. at Harvey for laying operations in Alabama and Mississippi. The pipe, enough to lay about 210 miles of lines, was shipped by A. O. Smith of Texas (The Oil and Gas Journal, June 29, page 129).

For easy handling of thin-walled pipe...
CROSE PIPE CRADLES

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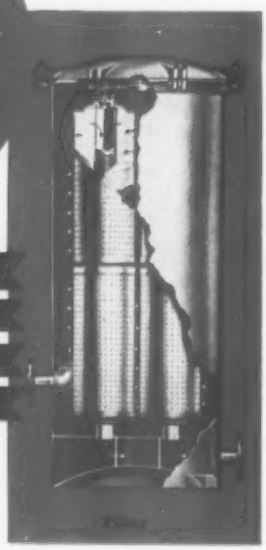

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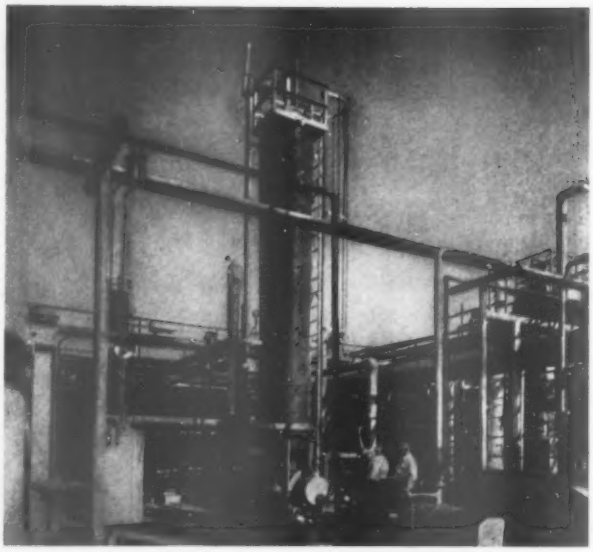

4-Day Tower Cleaning Job Now Done In 20 Hours

with saving of $695.00!

THAT'S THE REPORT from a Texas plant superintendent. His 45 foot absorber tower produces 120,000 gals a day. Cleaning it used to take 4 days, with a production loss of $26,800.

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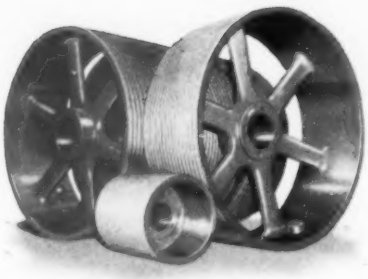

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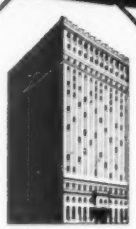

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- NEW MODERN ADJOINING GARAGE

THE MAYO

TULSA'S FINEST HOTEL

Home of the Popular Terrace Room

along its 280-mile gas-transmission line through the Spraberry Trend area to Yoakum County, West Texas.

The company's Plymouth station will house three 1,320-hp. units; the Pembrook station, eight 1,320-hp. units; and the Spraberry station, seventeen 1,320-hp. units and dehydration facilities.

All of the stations are located adjacent to natural-gasoline plants owned by Phillips Petroleum Co.

Great Lakes Plans Extension Of System to Grand Island

KANSAS CITY, Mo.—Great Lakes Pipeline Co. revealed last week that it will extend its products carrier system to Grand Island, Neb., where a delivery terminal will be constructed.

The company said work will begin as soon as materials are available and that the new terminal probably will be in operation late this fall.

Great Lakes currently transports products from Oklahoma and Kansas refineries through its lines to 14 delivery terminals in seven Midwest and North Central States.

Sohio Petroleum's Woodlawn Gathering System to Open

MARSHALL, Tex.—A 15-mile oil and distillate gathering system will be opened this week by Sohio Petroleum Co. in Woodlawn oil and gas field near here. This is the second major gathering system for the area.

Collection point will be 4 miles north of Marshall and ½-mile west of U. S. Highway 59. It initially consists of a 10,000 and a 5,000-bbl. tank and one pump station.

Marketing outlet will be via a pipe line from the tank farm and pump station, running south of Mid-Valley Pipeline Corp.'s carrier. Mid-Valley will transport the liquids to Sohio's four refineries in Ohio for processing.

Collection during July is expected to run around 1,100 bbl. of oil and distillate daily, under the allowable production set up by the Texas Railroad Commission.

Most of the gathering system main line and laterals is of 4-in. pipe.

Southern Counties Gas Plans New California Line

WASHINGTON. — Southern Counties Gas Co. of California has filed application with the Federal Power

See Composite and Refinery Catalogs, or Write for Folder On

FLEET-LINE

PIPE SADDLES AND REDUCERS

Nozzle sizes from ¼" to 24" — ASTM A234

Also for pressure vessel heads

Nominal pipe sizes 1" to 24" — ASA B16.9, ASTM A234

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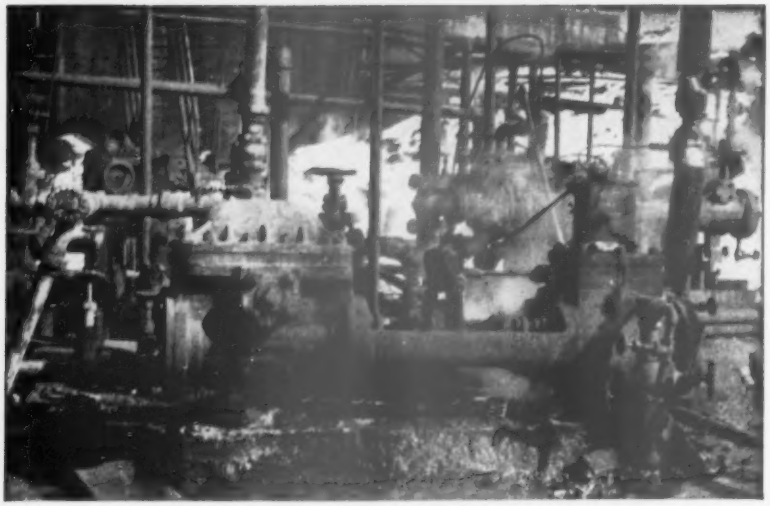

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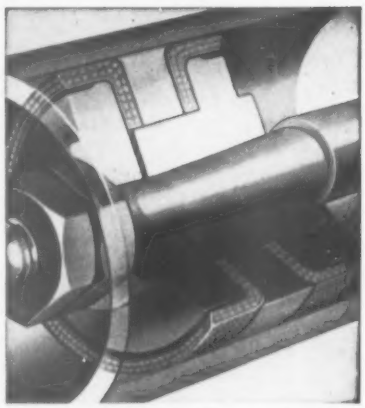
"HOW tough can life get", says ordinary packing inside this pump. Yet, year after year this pump is required to handle acid treated oil products from the base of a heated still to the next purifying process.

Ordinary packing would soon allow slippage to occur—but not Darcova Pumcups. Pumcups retain their efficiency even when severely worn. This installation has operated efficiently for over eight years.

No matter how tough your pumping problem may be, you can do it more efficiently and for lower cost with Darcova Pumcups!



Cross section showing Pumcup installed.

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PUMCUPS

Commission for authority to construct a 14-mile line to meet additional demands in Orange County, California.

The proposed line would include 72,000 ft. of 24-in. pipe and 1,000 ft. of 22-in. pipe with a capacity of about 120,000,000 cu. ft. per day.

Plans call for the new line to connect with the company's Blythe-Santa Fe Springs line near Brea and run to Santa Ana. Construction will cost an estimated $879,962.

FCC Approves Construction Of Pipe-Line Radio Units

WASHINGTON.—Construction permits for 16 base stations, 692 mobile units, and 3 fixed relay stations in the petroleum radio service have been issued by the Federal Communications Commission as follows:

Southern Natural Gas Co., for three base stations at Franklinton and St. Bernard, La., and Louisville, Miss., on 49.06 mc.

Colorado Interstate Gas Co., for one base station at Dumas, Tex., on 48.82 mc.

East Tennessee Natural Gas Co., for three base stations at Knoxville, Theta, and Lobelville, Tenn., on 48.85 mc.; three fixed relay stations at Greenbrier, Signal Mountain, and Bon Air, Tenn., on 48.58 mc.; and 30 mobile units on 48.58 mc. and 49.10 mc.

Leonard Pipe Line Co., for two base stations at Alma, Mich., and near Sterling, Mich., and for 37 mobile units on 49.02 mc.

Service Pipe Line Co., for two base stations at Tioga, N. D., and Rochester, Tex., on 49.14 mc.

Interstate Oil Pipe Line Co., Shreveport, for one base station near Antioch, Okla., on 158.31 mc.

United Gas Pipe Line Co., for 300 mobile units on 48.78 mc. in Texas, Louisiana, Mississippi, Alabama, and Florida.

El Paso Natural Gas Co., for 225 mobile units on 48.74 and 153.17 mc. in New Mexico, and western half of Texas, Utah, and Colorado.

Price Gets Coating Contract

BARTLESVILLE, Okla.—The recently organized Wolverine Pipe Line Co. has awarded H. C. Price Co. here a contract for application of Somastic coating to about 50 miles of a new 16-in. products line.

Also, Price will apply a concrete jacket of Hervicote to 5.3 miles of line. The Wolverine system will extend from East Chicago to Detroit, with a lateral extending south to Toledo.

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● High Efficiency

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REFINING

Catalyst Need

Free-world requirements to double by end of 1954

WASHINGTON. — Requirements of the free world for cracking catalysts will be almost double the 1952 requirement at the end of next year, it was predicted last week by Associate Deputy Petroleum Administrator C. E. Davis.

These requirements will be substantially met by plants now in existence and planned for construction, but additional expansion to provide more capacity for manufacturing both fluid and pellet types of catalysts may prove desirable as a reserve for wartime emergency, Davis said.

The entire supply of refiners in the United States and friendly foreign nations is now produced in nine plants in this country. A tenth plant and an addition to an existing plant are planned for construction, and three plants are now being built in foreign countries.

A survey by the Petroleum Administration for Defense, just completed, showed that the refining industry in the United States and other noncommunist countries consumed 10,800 tons of fluid-type catalysts and 3,440 tons of pelleted-catalysts per month last year. By January 1955, PAD estimates, requirements will be 18,300 tons and supply 17,850 tons a month of fluid catalysts, and pelleted catalysts will be 6,850 tons a month with supply at 6,730 tons.

The survey projected an increase of 72 per cent between 1951 and 1955 in installed fluid cracking capacity and 66 per cent in installed moving-bed cracking capacity.

By 1955, consumption of catalysts per barrel of installed cracking capacity is expected to be about 10 per cent higher than in 1952. This reflects the steady trend toward cracking of heavy feeds higher in metals and sulfur content and because many refiners are finding that higher catalyst replacement is financially attractive, Davis explained.

ASPPA Begins New Year Short on Aviation Gasoline

WASHINGTON.—The Armed Services Petroleum Purchasing Agency started the new fiscal year approximately 2,000,000 bbl. of Grade 115/145 and 1,500,000 bbl. of Grade 100/130 aviation gasoline short of its requirements for 1954.

ASPPA officials said there were also small shortages in a few other products, but, from the volume of offers received, they were not expected to present any particular procurement problem.

First Report on Jet-Fuel Output Shows Increase

WASHINGTON. — The Bureau of Mines, authorized by the Munitions Board of the Defense Department has issued for the first time monthly figures on jet-fuel production.

In its monthly statement for April,

NELSON REFINERY CONSTRUCTION INDEX

Appears in the first issue each month.
Explanation—"News Items That Appear in Quarterly Cost Indexes," July 7, 1952, pages 105 and 106.
Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, and October.

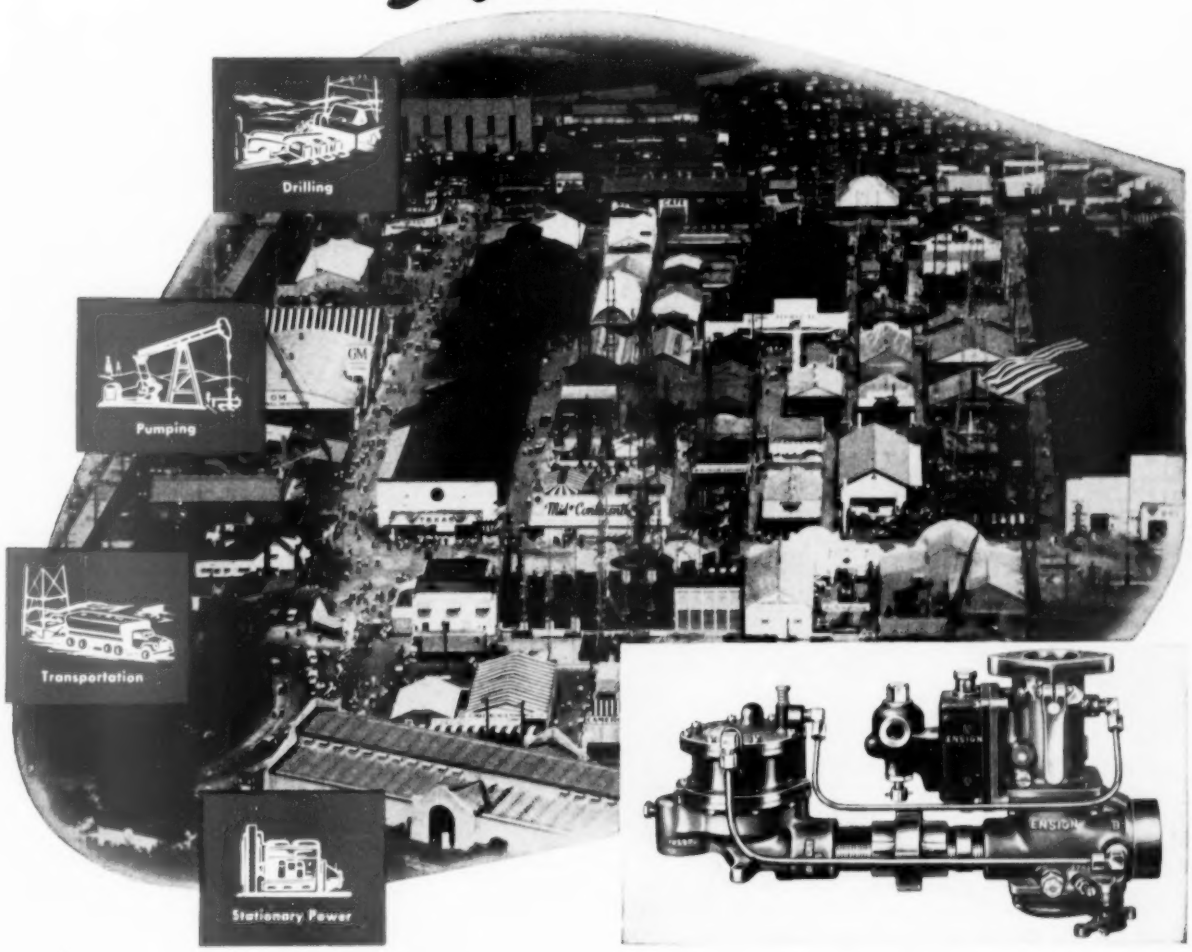
INDEX (1946 = 100)

	1948	1949	1950	1951	1952	Mar. 1953
Pumps, compressors, etc.	127.0	135.9	138.2	155.9	155.6	156.7
Electrical machinery	127.6	130.9	134.9	154.3	152.4	151.7
Internal combustion engines	116.9	124.8	126.0	146.1	146.5	146.2
Instruments	120.0	122.0	127.8	142.3	146.2	148.1
Heat exchangers	130.0	133.0	140.0	152.0	165.8	172.4
Miscellaneous equipment average	*122.1	*121.6	*126.2	*145.1	153.3	155.0
Materials component	139.3	143.6	149.5	164.0	164.3	167.8
Labor component	128.0	137.1	144.0	152.5	163.1	170.0
Refinery construction index	132.5	139.7	146.2	157.2	163.6	169.1

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

at the Tulsa oil show

97% ENSIGN



By actual count at the world's greatest oil equipment show in Tulsa, 97% of all natural gas engines carried Ensign Carburetion.

Significant too, many of the Ensign installations exhibited were of the multi-fuel type, that is, Ensign carburetion which permits use of natural gas, gasoline or LP-Gas. This "combination" is ideal for engines used on well drilling and servicing because it facilitates easy relocation of the rig from one lease to another.

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the bureau reports jet-fuel output for that month was 2,635,000 bbl., an increase of 685,000 bbl. daily over production in January and 336,000 bbl. over that in March.

A breakdown of production by months since the first of the year is shown in the accompanying table.

JET-FUEL PRODUCTION
(Thousands of barrels)

Month—	From Gaso.	From Kero.	From Distl.	Total
January	1,533	274	143	1,950
February	1,579	415	432	2,426
March	1,556	426	317	2,299
April	1,726	612	297	2,635

Platformer Sets New Records At Johnson Oil's Refinery

CLEVELAND, Okla.—Johnson Oil Refining Co.'s Platformer has set a world's record by operating on its initial catalyst charge since it went on stream June 21, 1951.

In addition the Platformer, licensed by Universal Oil Products Co., has operated 97.6 per cent of the time the refinery has been in operation during the 2-year period.

At the end of its second year of operation, the Platformer had processed 1,050,000 bbl. of charge and produced 971,500 bbl. of platformate. Also, the unit has charged more than 167 bbl. of reactor charge for each pound of the original catalyst.

Douglas Erects Reformer

BAKERSFIELD, Calif. — Douglas Oil Co. expects to complete installation this year of a new catalytic reforming unit at its refinery here.

The reformer is of the type licensed by Atlantic Refining Co.

The unit is expected to aid in producing gasoline up to 97 octane. Presently the refinery has a skimming and asphalt plant with a crude capacity of 7,800 bbl. daily and a thermal cracking capacity of 1,500 bbl. per day.

Refining Brief

TOLEDO.—Standard Oil Co. (Ohio) last week received the "safest refinery" award of the National Petroleum Association's department of fire and accident prevention. The award was in recognition of the fact that Sohio's Cleveland No. 1 refinery operated throughout 1952 without a lost-time accident. The refinery's safety record, including all of 1952, extended for 740 days, or 3,100,000 man-hours, without a lost-time accident. The award was received by William F. Smith, safety engineer at the 50,000-bbl. Cleveland refinery.

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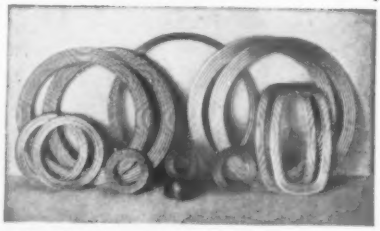
CORRUGATED METAL
GASKETS?



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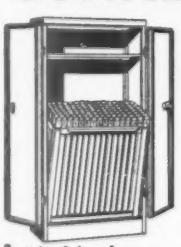

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Metal cabinet map file with locking doors. 112 tilting tubes. Easy to file and find maps, tracings to 60".

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12 mils of protection . . . In this magnified cross sectional drawing note how the heavy adhesive mass actually penetrates metal porosity—fills pits and voids.

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The first barrier of this coating is an extra heavy, 4 mil adhesive, which provides a superior bond to all metal surfaces as well as to its own backing. And this specially developed synthetic adhesive does more than form a tight bond—because of its thickness it actually penetrates a pipe's surface voids, pits and pores—fills them in with a material that provides excellent protection indefinitely over a wide range of temperatures and conditions.

The second barrier is a tough, elastic 8 mil *polyethylene* film, adding all the well-known properties of *polyethylene* to the protection already provided by the adhesive mass.

These two barriers, bonded together by a new process, is the solution to your corrosion problem. Polyken Protective Coatings are available in two colors: No. 900, black and No. 910, aluminum gray. Test samples and further information are available now.

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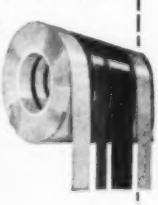

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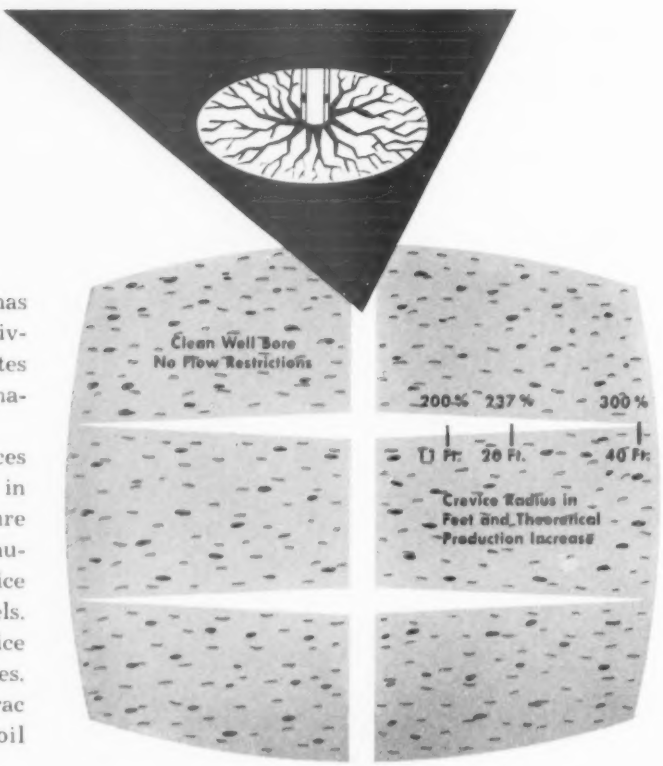

Maximum expectant results under stated conditions with Hydrafrac methods, and one crevice. Several crevices, if applicable, will raise the over-all % increase for the well.

This effective hydraulic fracturing service has become a vital factor in boosting well productivity for one important reason. It actually creates effective permeability in the producing formations in the vicinity of the well bore.

How Halliburton's Hydrafrac Service induces greater permeability is now a familiar story in the industry. A viscous gel is caused to fracture the desired formation through powerful hydraulic action. Graded sand injected into the crevice with the gel remains to prop open the channels.

Results from the use of this important service have been outstanding in widely varied instances. Some 75% of all wells treated with Hydrafrac Service have responded with additional oil recovery.

Hydrafrac Service, valuable in reviving older wells, is becoming increasingly important as a completion process. In either instance, your nearby Halliburton representative can provide you with swift service. Or contact Halliburton Oil Well Cementing Company, Duncan, Okla.

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Among the Drilling Contractors

Lewis Starts New Test In Wolfpoint Dome Area

Will I. Lewis Drilling Co., Mount Vernon, Ill., and Denver, is strung out on a deep test it has contracted to drill for Continental Oil Co. in the Wolfpoint Dome area, Roosevelt County, northeastern Montana. The Wolfpoint field is the most northerly production in the Montana portion of the Williston basin. The contractor's Oilwell "76" rig is being used with C. V. Leslie as tool pusher.

This contractor also has a rig, its Unit "20," working for Stanolind Oil & Gas Co. in the Grass Creek area of Hot Springs County, Wyoming, on the west side of the Big Horn basin. I. Dee Gilbert is tool pusher on this rig.

Terminal Drilling Co. has contracted for a wildcat test to be drilled just east of Beaumont, in 12-3s-1w, in Riverside County, California. The test will be designated as 1 Drew.

Milton Crow, Inc., Shreveport, is moving a rig to a wildcat location 3¼ miles west of Fouke, in Miller County, southeastern Arkansas, for a projected 5,000-ft. Cretaceous test to be drilled for Tom Palmer, independent operator of Shreveport. Location, in the SE NE NE 24-17s-20w, is 2¼ miles west of the West Fouke field.

New Kansas Drilling Firm

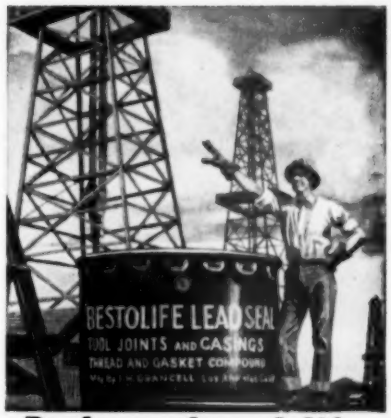
Kiefer & Krause Drilling Co. is a newly incorporated drilling firm operating in Kansas. Headquarters are at Great Bend with Melvin Kiefer as resident agent.

Kirkwood & Co. will drill an 8,500-ft. well for the William Herbert Hunt trust estate in the Arneckeville field, 10 miles south of Cuero, in DeWitt County, South Texas. Location is for 1 Egg-Junker unit, in the Mumfor House Survey.

TGM Drilling Co. has a contract with Heep Oil Corp. for a 9,000-ft. wildcat test, 1 Crump, located 6 miles northwest of Mission and about 4½ miles northeast of the active Tabasco field, in Hidalgo County, in the Texas Rio Grande Valley.

Delta Gulf Drilling Co., Tyler, Tex., has contracted for a 19,350-ft. wildcat test to be drilled just south of the La-

ON THE JOB . . . W. N. Blanton (top left), president and principal owner, Blanton Drilling Co., Houston, with his tool pusher, W. E. Pullin (top center); driller, Leon E. Marburger (top right); and other day-tour crew members on a wildcat location the company is drilling in the Egypt area of Wharton County, Texas Gulf Coast. Crewmen, front row (left to right) are: J. G. Weber, G. L. Ballard, B. G. Mitchell, and Bobby Fregia. The rig is one of three the company operates on the Gulf Coast.



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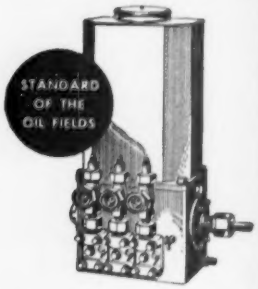

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fayette Parish line in northern Vermilion Parish, coastal Louisiana. Location of the test, 1 Morgan, in 34-10s-2e, is 7 miles northwest of the Abbeville field, and about 4 miles southeast of the South Crowley field, in Acadia Parish. Operators are Lamson, Bennett & Cole, of Lafayette, La.

Lonnie Glasscock is the contractor on a 7,500-ft. test which Puenticitas Oil Co. is starting in the North Agua Dulce area, 5 miles northeast of Banquete, in Nueces County, lower Texas Gulf Coast. The location, 1 Countiss, is north of production.

Penrod Drilling Co., Shreveport, is drilling a projected 12,500-ft. test for Placid Oil Co., an affiliated producing firm, in the Lapeyrouse gas area, in the coastal marshes of Terrebonne Parish, Louisiana. The test is carried as 2 Dupont, and is just west of previous wells drilled in the area.

Whitehurst Drilling Co., El Dorado, Ark., has a new operation under way for Kirby Petroleum Co. in the Langsdale field, in Clarke County, Mississippi. The new well is 4-E Long Bell Petroleum Co. Hole is projected to the field's Eutaw pay zone around 3,300 ft.

Joe Payne is contractor on a 6,000-ft. Stillwell test which Delhi Oil Corp. is drilling ¾ mile northeast of the one-well Mary field, in Jim Wells County, South Texas. The Mary field produces gas and distillate from Frio sand at 4,780 ft. Delhi's new operation is 1 Richter, in Share 8-A, Los de Abajo Grant.

Scooter's Drilling Service Co., Bossier City, La., is contractor on a 3,000-ft. Woodbine wildcat test which L. L. Chevalier, Atlanta, Tex., is starting at 1 Guy, in 3-11n-13w, 3½ miles southeast of Mansfield, in DeSoto Parish, northwestern Louisiana.

ACTIVE ROTARY RIGS*

Area—	Week ended 6-29-53	Change week ended 6-22-53	6-30-52
Gulf Coast	601	+ 1	+40
N. & W. Tex.-N. M.	820	— 1	—98
Ark.-N. La.-E. Tex.	142	— 8	— 2
Oklahoma	337	+11	+26
Kans.-S. Neb.	159	— 7	— 9
Illinois-Eastern	148	— 3	—25
Rocky Mountains	264	+ 1	+29
Pacific Coast	171	— 2	+ 8
Total U. S.	2,642	— 8	—31
Western Canada	183	—12	+ 6
Total	2,825	—20	—25

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, Gulf Coast, and Arkansas - North Louisiana - East Texas are shown on pages 159 and 160.

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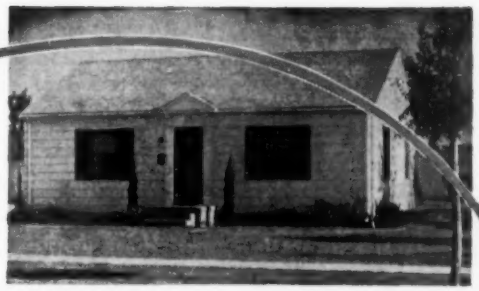

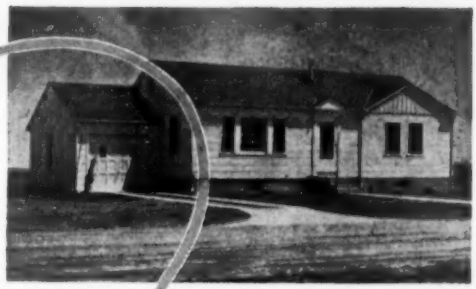

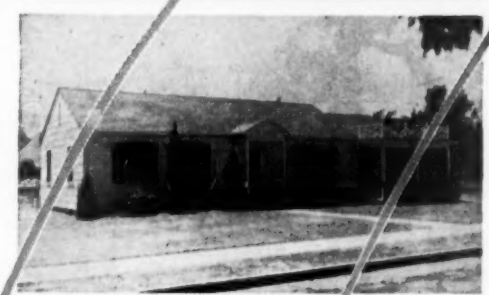

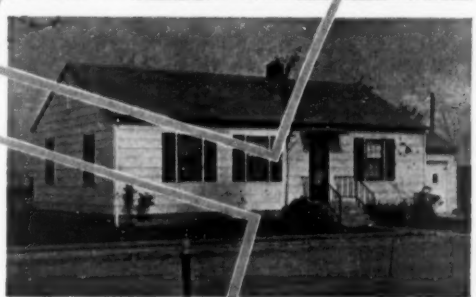

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EXPLORATION

New Look for Williston Basin

by Philip C. Ingalls

AN assured discovery about 100 miles south of Beaver Lodge field, three additional discoveries on the Nesson anticline, and a discovery north of East Poplar field have given the Williston basin the booster shot it has been expecting for the past few months.

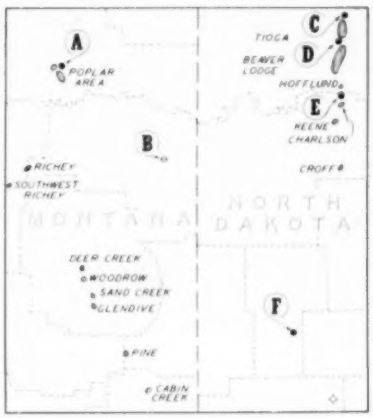
Of the five discoveries, the most significant is Amerada Petroleum Corp. and Northern Pacific Railroad 1 May, NW NE 9-139n-100w (F on map), Billings County, North Dakota. This wildcat is on an isolated seismic high nearly 60 miles south of the southernmost production on the Nesson anticline at Croff pool and about the same distance east of Cedar Creek anticline production at Pine unit.

On a production test of the open-hole interval 9,403-66 ft. in the Madison, the 1 May flowed 392 bbl. of 40°-gravity oil through a ⅜-in. choke on a 24-hour gage. Gas-oil ratio was 500:1. This rank wildcat, indicating the first significant production found in North Dakota off the Nesson anticline, is to be deepened. If the uncut portion of the Madison proves exceptionally promising the wildcat may be completed without checking deeper rocks, otherwise the hole may be carried into the Ordovician.

To the north, on the Nesson anticline, Amerada 1 Yttredahl, SW NE 33-154n-95w (E on map), drill-stem tested 122 bbl. of 41°-gravity oil in 9 hours from perforations at 8,246-8,300 ft. in the Madison. This wildcat is located between two small Madison discoveries.

Farther north on the big structure is Amerada 1 Haustveit, NE SE 23-157n-95w (D on map). This wildcat was completed flowing 346 bbl. of 41°-gravity oil and 39 bbl. of water daily on a 20/64-in. choke from the Madison at 8,276-90 ft. It is located about halfway between the two biggest fields in the Williston basin where more than 150 Madison wells have been completed. Just how this discovery fits into the structural pictures developed by wells at Beaver Lodge and Tioga is not determinable yet and variations in the water table preclude justifiable predictions for the undrilled locations in the immediate area.

About 2 miles north of Tioga field,



Scene of Williston basin discoveries.

Warren Petroleum Corp. has completed 1 Anderson, SE SE 31-159n-94w (C on map), flowing 252 bbl. of 41°-gravity oil and 85 bbl. of water daily through ¼-in. choke from the Madison at 8,110-30 ft. Locations around this discovery face the same uncertainties as those near the 1 Haustveit.

In the East Poplar area, Empire State Oil Co. 1 Smith, S½ SW SE 8-29n-51e (A on map), has flowed oil at a rate of about 1,500 bbl. daily from two zones in the Madison at 5,750-57 and 5,770-78 ft. Duration of tests and choke size were not reported. This well is structurally lower than a dry hole drilled on the east side of East Poplar field and is also lower than North Poplar wells 4 miles to the west in a syncline off the northwest corner of East Poplar unit.

Sun Oil Co. and Phillips Petroleum Co. 1 Dynneson, SW NE 32-24n-58e (B on map), is still testing. This wildcat flowed more than 200 bbl. of oil on a 24-hour test of the Ordovician at 12,585-12,605 ft. before running into complications with salt water and plugged perforations.

Though each of the five recent discoveries is very important to the developing Williston basin, the Billings County wildcat has special significance. This assured discovery calls for an increasingly skeptical attitude toward the growing idea that perhaps truly big oil accumulations are restricted to the basin's three regional structures—Nesson, Cedar Creek, and Poplar anticlines. To date no developments off these features have proved sizable oil fields, but now that oil has been found on a comparatively small, isolated, seismograph-found structure at a depth that is not forbidding, a new look at the Williston basin is definitely in order.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

COLORADO . . . Mountain Fuel Supply reported gas in a sand of the Mesaverde at 5,146-86 ft. at their Sugar Loaf wildcat in the SE SW NE 9-11n-101w, Moffat County. The well flowed 4,670 M.c.f. of gas daily on a 90-minute drill-stem test.

MISSISSIPPI . . . One of the best wells in Muldon gas field has been completed at Union Producing Co. 1 Ott Unit, 26-15s-6e, Monroe County. The well flowed at the rate of 4,879 M.c.f. of gas per day on ⅜-in. choke.

WEST TEXAS . . . Gulf Oil Corp. and Stanolind Oil & Gas Co. 1-EH State, Crane County strike, completed from the Ellenburger at 11,890-11,935 ft. for 356 bbl. daily through ½-in. choke. The well also flowed oil from the Tubb zone of the Permian, and from the Waddell and Connell sands of the Simpson.

SOUTHEAST NEW MEXICO . . . Forest Oil Corp. 1 Federal-General American Oil Co. of Texas, rank wildcat in northeast Chaves County, developed a flow of oil on a drill-stem test from 7,754-7,888 ft. Stanolind et al. 1-AB State, deep test in the Empire area, flowed an estimated 50,000,000 cu. ft. of sweet gas from the Pennsylvanian at 10,135-10,241 ft.

REASON • MEN • TOOLS • MONEY • LUCK . . .

HERE THEY ARE—THE

Five Most Important Factors in Oil Finding

by Dorsey Hager

IN seeking new oil plays there are five factors which can be considered the most important. These factors are:

1. Some reason for drilling test holes.

2. Personnel trained in drilling and in well completions.

3. Machinery with which to drill deep enough to make thorough tests.

4. Money with which to drill test holes.

5. Luck.

1 Some reason for drilling is the first factor of major importance. This is where the geologists and geophysicists are valuable. Numerous holes will be drilled without technical advice as there are still promoters and even some oil operators who will elect to drill for no apparent reason except a whim or a hunch, or following a willow stick, or other "doodle bugs." Once in a while such tests open oil or gas fields and they cannot be disregarded.

However, today the majority of new tests are made where geological or geophysical surveys, or both, indicate the most likely spots for testing. It is here that the geologists and the geophysicists have performed brilliantly in the past and will do so in the future, but their efforts must be increased to take care of the increased demand for gas and oil.

Ira Cram has given some pertinent advice to geologists and geophysicists. He calls for imagination and courage on the part of technical men in the selection of new places for testing. He aptly points out that all the geophysical and geological gadgets are but adjuncts to technical men and that geologists' and geophysicists' minds are the keenest instruments or tools they possess, not only to interpret data but to go beyond the facts and use constructive imagination.

Technical men must be on their toes and select places to drill even though all the data they desire may not be at hand. Facts that point to a possible structure or a stratigraphic trap may well be the reason for drilling. Ideal conditions are now seldom found. However, one must weigh the costs in money and time, and the availability of competent workers.

2 The second factor, personnel, offers less difficulty, especially in the drilling of rotary holes; but trained personnel familiar with sound well completions are not as readily found. The "bringing in" of a well is often a delicate operation which requires far more skill than in drilling. Good completion personnel are scarce. Petroleum engineers can assist, but a trained production man is needed for such an operation. Careful cement jobs, proper perforating of casing, careful acidization, and formation fracturing are all functions of proper well completion.

3 Rotary machinery capable of drilling 20,000 ft. and more has been developed, but comparatively few wells will be drilled to such depths—not only because of the expense involved, but because there are not too many places where exploration could be carried that deep and find oil pays that would prove profitable. In the Rocky Mountain area several basins do carry 50,000 ft. and more of sediments.

For low-pressure areas where rotary tools might mud off pays, an improved cable-tool outfit capable of drilling and "tailing in" holes 13,000 ft. deep has been developed. This gives the oil seeker another tool.

4 Financial backers are the ones that the oil seekers must satisfy. Financial arrangements are affected by the demand or need for oil, but primarily are based on the profits that can be derived from satisfying the demand. Capital for new tests is often termed venture capital where obtained from the outside public, but where derived from the professional oil men, it is drawn from current funds.

Today a large volume of venture capital is seeking the oil business due to the depletion allowance on productive oil properties. Also due to the excess-income-tax situation many people who have money that would be taxable are willing to venture it into oil prospects. How much money is ventured this way is hard to estimate, but the total volume must be very substantial.

New tests made by tax capital has enabled the oil business not only to maintain production, but to increase oil reserves despite increased demand.

The oil business is in a healthy state financially. However, oil producers spend nearly 33⅓ per cent of their annual income seeking new oil fields. The 27½ per cent depletion allowance fails to cover the expenses of finding new fields.

5 With all the other factors satisfied there still remains an element of luck. If one wishes, call it calculated risk, but that does not change the picture.

One may have two ideal surface highs both checked by the seismograph to show subsurface highs. Both prospects occur in an area favorable for gas and oil. One fold proves productive, the other fails to produce commercially, yet in advance both seemed equally good. In the nonproductive "high" the sandstones found were too tight to hold gas or oil in large quantities. Such dry folds occur in all oil areas and cannot be predicted in advance. Until a method of determining the positive presence of gas or oil in commercial volumes has been developed, only drilling will supply the answer. Luck is the only term that covers such cases.

Other factors such as distance from

"The law of diminishing returns functions in oil finding as in other businesses. Much new oil will be found but at increasing cost of money, time, and effort."

C. H. Broussard, Vice President of Independent, started out as a helper for IX 15½ years ago after attending LSU and Georgia Tech. He has progressed through every job in the exploration field including computer, party chief, review department head, and chief geophysicist. He has a total of 17 years experience in geophysical work.

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railroads, accessibility of the area, and quality of the oil must all be considered. But so far accessibility has not held back development. Holes are put down on mountain tops, offshore in the bays, seas, and oceans, and in the barren deserts, and deepest swamps. The oil man goes wherever oil may be found, and finds some way to market his oil.

The old story of the oil man who went to Heaven and found it filled to capacity with oil men but found a place by rumoring that oil was struck in Hell, and then began to believe his own rumor, has deep implications. Whoever originated that story knew the practical oil man.

Today, as never before, the oil industry needs the type of men who will pioneer. Geologists who are at the forefront guiding such pioneering need intelligence, courage, and constructive imagination. They need those qualities as never before to get their views across to the company heads and to the individual oil operators who control the purse strings.

Most oil producers are optimists and are not afraid of long chances. They seek results but they need the guidance of the geological fraternity in picking new places for prospecting. The geological fraternity is in there pitching hard, and is confident that it can do its part in maintaining production, but it is only part of the team and needs the fullest cooperation from the financial and operating branches of the industry. So far such cooperation has been accorded geologists and geophysicists, but new fields are increasingly more difficult to find.

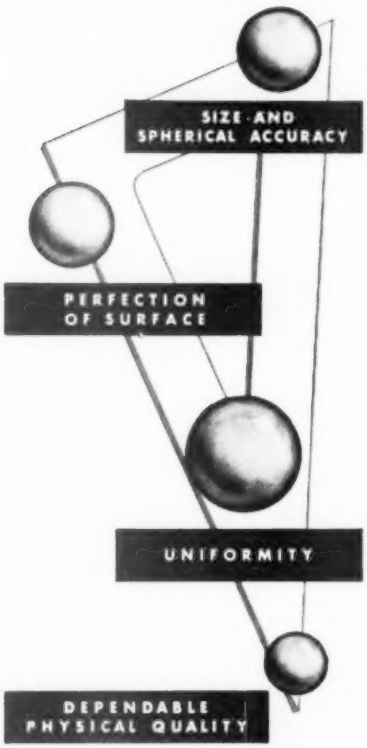
Technical guidance will still be of great importance, but capitalists and managements must expect fewer successes than in the past for their dollars, as marginal and more doubtful prospects are the ones left to drill. The law of diminishing returns functions in oil finding as in other businesses. Much new oil will be found but at increasing cost of money, time, and effort. The time will ultimately come when oil shales, tar sands, and the coals will supplement oil from wells, but that time is not yet here and won't be here until the oil men of all kinds have exhausted their ingenuity.

ARKANSAS

Operator Drilling Ahead At Cotton Valley Test

Murphy Corp. is drilling ahead at 8,060 ft. at 1 Birtie, C SW NE 6-19s-18w, indicated Cotton Valley oil discovery 2 miles east of the town of Atlanta, Columbia County. Recovery on a 12-minute drill-stem test at 7,594-7,605 ft. was 1,000 ft. of 42°-gravity oil, 540 ft. of gas-cut water cushion, and 30 ft. of oil and gas-cut mud.

from any angle



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KANSAS

Morrow Gas Strike Extends Richfield

Morton County's Richfield gas pool on the western edge of Hugoton gas field has been extended 1 mile west by J. M. Huber Corp. The 1 Church, SW SW NE 18-32s-40w, gaged 5,200 M.c.f. of gas per day from the

Arrow points to new Morrow sand gas discovery 1 mile west of Richfield pool on the west edge of the vast Hugoton gas field in Morton County.

Morrow cut at 5,173 ft. Perforations are at 5,456-62, 5,408-10, and 5,400-06 ft. The flow was through a ½-in. choke.

The Morrow sand of Pennsylvanian age is a new pay for the Richfield area. Richfield pool produces gas and condensate from the basal sandstone of the Atoka group. Production in Hugoton gas field to the east is from porous limestone and dolomite beds of early Permian age on an eastward-dipping regional structure. The Pennsylvanian pools of Morton County and Oklahoma's Cimarron County to the southwest produce gas from sands above unconformities on local structures.

This new Morrow sand discovery is the latest in a series of significant developments in the Hugoton embayment this year. Richfield pool lies just northeast of expanding Greenwood gas pool, Kansas' westernmost producing area. Greenwood produces from the Morrow sand and the Lansing lime of Pennsylvanian age.

This portion of the Hugoton embayment, which is the northerly extension of the Anadarko basin, has been the most active exploratory area in the Mid-Continent region this year. Oklahoma's new Keyes sand gas area in the northeastern portion of Cimarron County in the Oklahoma Panhandle is currently the most active new area in this section. The new Keyes sand Strugis gas area lies about 15 miles west of the Hugoton gas field, just southwest of Greenwood gas field.

Activity Up in Nemaha Ridge

Five new wildcats are slated for Butler County and Cowley on the Nemaha granite ridge.

John Graves has located 1 Filmore, SW SW SE 25-26s-7e, 2 miles east of Young pool in Butler County. J. P. Gates has set surface casing at 1 Wolfe, SE SE NE 10-27s-3e, wildcat 3 miles northwest of Bausinger pool in Butler County. Also in Butler E. M. Clickner is drilling below 2,370 ft. at 1 Miller, SW SW NW 31-29s-5e, 2 miles northwest of Combs pool. Laura Jane Oil Co. has a wildcat slated at 1 Kitch, SW SW SE 29-32s-4e, Stayton pool step-out in Cowley County. C. K. Gilliland has a discovery well assured at 1 McEwen, SE NE SE 9-34s-8e, 4½ miles southeast of Ottor Creek pool in southeastern Cowley. The well is pumping 15 to 20 bbl. oil per day from the Mississippi according to reports.

New Pool Opened in Pawnee County Area

A new pool has been opened by Petroleum, Inc., in Pawnee County on the southwest flank of the Central Kansas uplift at 1 Hauser, SW SE NE 31-21s-15w.

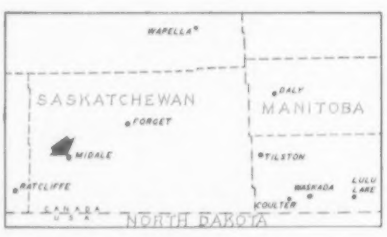
The wildcat lies 1½ miles east of Evers pool and 4 miles east of Larned in the east-central part of the county. The discovery was completed for a flow potential of 48 bbl. of oil per day from the Arbuckle perforated at 3,915-18 ft.

CANADA

British Columbia Takes Lead in Wildcat News

The northeast sector of British Columbia highlighted the western Canadian oil and gas industry during the past 7 days—in terms of discovery, as two wildcats in that region were chalked up as new discoveries. In addition to that pair of strikes, a Central Alberta wildcat discovered both oil and gas during the week, while key developments also took place at another seven exploratory and extension wells in the province.

One of the British Columbia finds gave up condensate along with natural gas, while the other was a natural-gas discovery. The Triassic zone "wet gas" strike came at the Northern Foothills Agreement group's Nig Creek wildcat, which lies in unsurveyed territory, 20 miles northeast of Mile Post 120 on the Alaska Highway. That venture flowed natural gas at maximum rate of 3,200,000 cu. ft. daily during initial drill-stem test at bottom 4,380 ft., and yielded a 75-minute pipe recovery of 10 ft. of naphtha. Other tests down to 4,404 ft. flowed gas at lesser rates and gave varying amounts



Arrow indicates most recent Mississippian discovery in the Canadian portion of the Williston basin. Shell Oil Co.'s Midale area strike produced 400 bbl. of 27°-gravity oil per day on initial potential from perforations at 4,596-4,636 ft. in the Charles (Mississippian). All pools shown on the map produce from the Mississippian except Wapella which has production from the Lower Cretaceous and Jurassic. Wapella and Daly pools are the largest in the area. Wapella has 14 producers, while Daly, the first pool in the Williston basin, has 35 producing wells. Forget is the only other pool opened in the area this year.

of naphtha recovery. The well is being deepened.

The other northeast British Columbia discovery was drilled by Pacific Petroleums, Canadian Atlantic and associates, in the Pringle Creek area, 8½ miles southwest of Fort St. John area gas wells. This test, Pacific-Atlantic 2 Pringle Creek, LSD 5, 26-81-18w6, received its production in the Cadomin formation, and indicated an approximate 25-ft. gas zone, with first test, bottomed at 3,965 ft., flowing gas at rate 825,000 cu. ft. daily. The well is on a separate structure from the Fort St. John producers, and is being deepened in search of lower productive zones.

Alberta . . . This week's Alberta gas and oil discovery is near the town of Ponoka, 55 miles south of Edmonton and 10 miles southwest of an oil strike on the Samson Lake Indian Reserve chalked up earlier this year. The well is Texaco A-1 Ponoka, LSD 3, 24-43-26w4.

Discoverer of the Ponoka production is Texaco Exploration Co. Texaco's well flowed natural gas at maximum rate of 6,200,000 cu. ft. daily during a series of tests in the basal quartz section of the Lower Cretaceous between 5,233 and 5,256 ft. Largest oil recovery during the tests came from interval 5,250-56 ft., which gave 2,000 ft. of gassy oil plus 900 ft. of salt water. Coring is being continued, with current depth below 5,375 ft.

Thckness of the oil zone is not as yet known, nor is it known whether or not commercial crude-oil production will be obtained at this site. Further testing operations will be necessary to fully evaluate the find.

South Westerose . . . Operations during the period under review also indicated that a thin oil column was present at the California Standard South Westerose D3 coral reef wet-gas discovery well in the Wizard Lake-Pigeon Lake reef trend, after finding an approximate 140-ft. gas cap. Formation water was entered and only small oil recoveries have been obtained in the lower portion of the reef.

EASTERN CANADA

Ontario . . . In Lambton County, Imperial Oil, drilling on the McCormick farm, south of Warwick Township struck gas around 1,800 ft. depth. Drilling was halted and the heavy gas flow cemented off to permit deepening to a lower level for oil. The location is considerably north and east of the former Dawn field.

Gaspe . . . In the Gaspe Peninsula of Quebec, Bald Mountain 2, on the Bald Mountain anticline, was shot with dynamite at the top of the lost tools at 5,107 ft. and is drilling past the tools below 5,145 ft.

On the Galt Brook dome, Continental Deep Test 1, is below 2,880 ft. and making oil and gas from 1,794-99 ft. A softer formation may indicate contact of the Grand Greve and Bel-Ami limestones. Asphalt Base 1, drilling below 1,045 ft. with hard formation growing softer, is making some gas.

Tar Point 1, on the Tar Point anticline, standing at 7,069 ft. waiting for equipment, is also making gas. Quebec Oil 2 is below 5,230 ft.

KENTUCKY

EASTERN KENTUCKY

In Big Sandy gas field and in the Pike County sector, United Carbon Co. has completed a good gas well at 25 Republic Steel Corp. Well flowed naturally at the rate of

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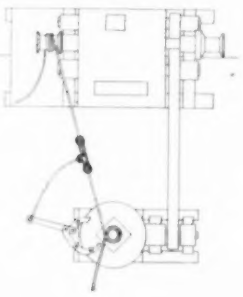

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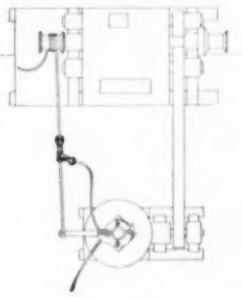

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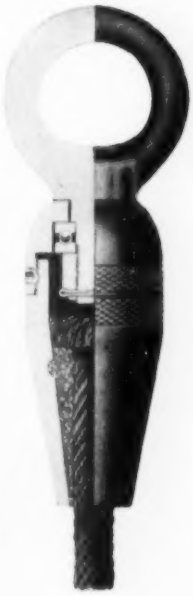

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2,119,000 cu. ft. of gas daily from Maxon (Mississippian) at a total depth of 2,523 ft. Top of sand was had at 2,348 ft.

Also in the Pike County sector of Big Sinking gas field, Columbian Fuel Corp. has completed a Mississippi Big lime well for an initial potential of 465,000 cu. ft. of gas daily. Top of Big lime was found at 2,560 ft. and total depth was 2,896 ft. Well was stage treated with 2,500 gal. of acid.

TEXAS

NORTH CENTRAL TEXAS

Second Godwin Well New Pay Discovery

Sinclair Oil & Gas Co. 2 J. F. Godwin, W. C. Caruthers Survey, 6 miles east of Sandusky, made a flush producer from a deeper horizon than the first well, and has been tentatively identified as an Ordovician discovery.

Formation tops and details were not disclosed at this report. However, operators tested on perforations at 8,923-58 ft., and gaged 318 bbl. of oil in 10 hours on ½-in. tubing choke. On completion potential the well made 765 bbl. of oil on the same size choke. Total depth was 9,015 ft.

Location of the new well is a northwest offset to Sinclair 1 Godwin, sand discovery which completed from pay at 7,114-55 ft.

Pennsylvanian discovery... Superior Oil Co. 1 Sturgess, wildcat 2 miles northwest of Sadler, completed for 98.6 bbl. of oil a day through a ¼-in. choke on perforations at 6,122-37 ft.

Wildcat drilling... East of Tioga, S. M. Aronson 1 Fred Reynolds had prospects of shallow production when the hole filled with oil after Sandfrac treatment. Total depth was 3,283 ft. and fillup was estimated at the rate of 25 bbl. daily.

B. M. Hester & Son 1 J. G. Huff, 5 miles southeast of Whitesboro, was testing on perforations at 5,661-84 ft., identified as the Dornick Hills sand. A previous drill-stem test from 5,675-92 ft., recovered 700 ft. of oil-cut mud. Location is 3½ miles east of the Mackoy Strawn field.

Shaw & Grace 1 Anderson, north extension attempt to Mackoy field, had total depth at 5,615 ft. and was testing. Drill-stem tests at 5,104-26 and 5,310-26 ft. developed salt water with no oil on the latter, and some oil-cut mud on the first test.

Jones County... M. D. St John and Minerals Royalty Co 1 Phillips Estate, Swastika discovery 12 miles west of Anson, completed for a daily flowing potential of 282 bbl. of 42° oil a day. The test was through 16/64-in. choke from perforations at 3,320-38 ft. Top of the section was 3,214 ft.

Montague County... Jack Grace Production Co. 1 Boedecker, J. Diaz Survey, was assured of discovery production from the Bend conglomerate. The well kicked off and flowed 60 bbl. of oil in 5 hours through ¾-in. choke from perforations at 5,970-80 ft.

WEST TEXAS

Second Devonian Well Flows in Payton Field

A second prolific gas-distillate well in the Devonian, located in the approximate center of the shallow Payton field, may prove to be a confirmation well to Cities Production Corp. 1 Payton, discovery well of the deeper horizon.

The new exploratory test is Luce & Ice, Dallas and Monahans operators, 1-A J. O. Brictson. This well topped the Devonian at 6,705 ft. on elevation of 2,439 ft., which checked around 62 ft. high to the same marker in 1 Payton. Drill-stem test from 6,705-99 ft., open 4 hours, had gas in 1½ minutes, making an estimated 20,000,000 cu. ft. of gas a day plus 30 bbl. of 68° distillate per 1,000,000 cu. ft. of gas. Flowing pressure through ½-in. bottom choke was 3,040 psi.

Second drill-stem test from 6,796-6,886 ft. had an increase in gas, and distillate yield was calculated up to 71 bbl. per 1,000,000 cu. ft. Recovery was reversed out, and there was no report of water.

Location of 1 Brictson in 6-32-H&TC is approximately ¾ mile southeast of Cities Production 1 Payton, and 2 miles south of the town of Grand Falls. Operators hold an 80-acre drilling block while six companies have a 2,000-acre unitized block around it.

Cities Production Corp. 1 Payton had drilled to 7,142 ft. and was testing between 7,049-7,142 ft.

Sutton County prospect... This county was in line for its first major oil discovery at Ashland Oil & Refining Co. and Belmont Oil Corp. 1 W. D. Wallace Estate, 17 miles southeast of Sonora and nearly 25 miles southeast of nearest oil production in the shallow Brushy Top field.

Tentative top of the Strawn limestone was 5,000 ft., on derrick floor elevation of 2,290 ft. First test at 4,997-5,026 ft. had gas in 3 minutes and oil in 15 minutes. It was flowed into pits for 6 minutes, making an

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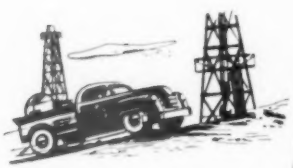

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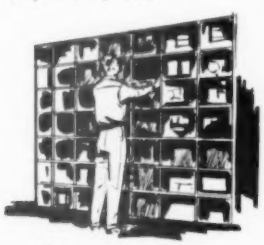

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estimated 40 bbl. hourly through open 2-in. tubing. Twenty-minute shut-in pressure was 2,375 psi. Operators were to core ahead before testing further.

TEXAS GULF COAST

Deep Production Spreads On Big Hill South Flank

Deep production opened last December on the south flank of the Big Hill dome in Jefferson County is being extended southwestward and outward from the dome with an indicated good well now being tested by Humble Oil & Refining Co.

The new well, 1 Woodward, located in the T. J. Baldwin Survey, 600 ft. southwest of the new deep pay's discovery well, is reported flowing at the rate of 142 bbl. of 30.9°-gravity oil per day through ⅛-in. choke with 350-psi. pressure on the tubing.

Pay zone is open through casing perforations at 9,307-16 ft. with bottom of the hole at 9,393 ft. The pay's discovery well, Hudson Gas & Oil Corp. 1 Finkelstein, higher on the dome, is perforated at 9,256-60 ft. and 9,267-71 ft.

Development of this and other comparatively recently opened producing horizons around the Big Hill dome is occasioning one of the most active drilling plays on the Gulf Coast.

Renewed Incentive Given Damon Mound Operations

Renewed incentive for further exploration on the northeast side of the old Damon Mound dome in Brazoria County is being given by the completion of another good well by W. Stewart Boyle. On potential gage, the well, 2 T. L. Smith, located in the A. Darst League, flowed 240.72 bbl. of 26°-gravity oil in 24 hours through 10/64-in. choke with tubing pressure at 475 psi. Gas-oil ratio was 346 cu. ft. per barrel. Production is from Frio sand with casing perforated at 4,416-28 ft. Location is 175 ft. east of the operator's 1 Smith.

Fourth Gas Well Added At Southwest Fairbanks

Completion of another good gas-condensate well, the fourth, is recorded by Amerada Petroleum Corp. in its new Southwest Fairbanks (East Satsuma) field, northwest of Houston, in Harris County. Production on potential gage was at the rate of 18,500,000 cu. ft. of gas and 290 bbl. of 55.4°-gravity condensate per day, open flow.

The well, 1 Adams, perforated at 7,468-74 ft., confirms production of the 7,500-ft. "B" sand in which the discovery well, 1 West, was completed at 7,495-7,500 ft. The field's other two wells produce from higher sands, one well being in the Goodykoontz sand, perforated at 7,226-34 ft., and the other in the second Fairbanks sand, perforated at 6,814-18 ft.

EAST TEXAS

Panola Field Extended

Bobby Manziel and V. R. Huffines 1 Pitts Unit, T. J. Kelly Survey, extended lower Petitt limestone production 1 mile south of Panola field with a daily flowing potential of 62,000,000 cu. ft. of gas, plus 2,480 bbl. of distillate.

Potential gage was through ½-in. choke, from perforations at 6,000-30 ft. Total depth was 6,135 ft.

SOUTHWEST TEXAS

Olmos Sand Produces in Dimmit County Wildcat

Bay City Drilling Co. is opening a new Olmos sand field in northern Dimmit County where its 1 Crenshaw, in Section 177-A, Cross S Ranch Subdivision, is being put on the pump following swabbing tests. While being swabbed, the well flowed by heads at the rate of 150 bbl. of 33.1°-gravity oil per day. Pay is open through casing perforations at 3,624-27 ft. Hole was drilled to 5,030 ft. and has bottom of the casing at 3,750 ft. Location is near the Zavala County line, approximately 4 miles southeast of Crystal City, in the latter county.

OKLAHOMA

1952 Discovery Has Twelve Net Oil Wells

Sunray Oil Corp. has completed 12 net oil wells in Northeast Little Chief field in Osage County. The pool was opened in mid-1952.

By the end of this year the company expects to have completed 26 net oil wells in the field, located in Sections 35 and 36, 25 and 26n-6e. Production in the field is expected to exceed 300,000 bbl. of crude oil. Sunray's large block of acreage in the area was acquired by the company's exploration department prior to field discovery after detailed studies indicated favorable subsurface structural and sand conditions.

The field wells produce from the Burbank (Pennsylvanian) sand from a depth of 2,800 ft. This is a relatively thick sand body but one with very low permeability which responds favorably to hydraulic formation fracturing. All the Sunray wells are flowing and had initial potentials ranging from 400 to 500 bbl. per day each. The field is prorated with allowables set at 65 bbl. per day per well. Engineering studies are now in progress to determine if some type of pressure maintenance is feasible for this field.

New Discovery Finaled In Lincoln County

Lincoln County in central Oklahoma continues to be the state's most active wildcatting area.

A new pool is opened at Blackwell Oil & Gas Co. 1 Jacob Henson, SE SE NW 4-13n-3e, 1 mile northeast of Happy Hill pool. The discovery well flowed 99 bbl. of oil per day on ¼-in. choke from the lower Skinner. Blackwell is drilling below 2,820 ft. at the southeast offset in NW NW SE Section 4, the 1 Beasler. The 1 Beasler will be taken to the Bartlesville sand which is productive to the southwest.

Elsewhere in Lincoln Sun Oil Co. has an excellent well at 1 Curry in the NE NE NW 9-15n-5e, Kendrick pool. The well flowed 415 bbl. of oil in 5 hours through a ¾-in. choke from perforations at 3,346-58 ft. in the Oswego lime.

Unconformity Test Finaled On Oklahoma City East Flank

A new oil producer has been completed east of the fault on the east flank of Oklahoma City field. The new well is Jay Simmons 1 Warren, C NE SW 18-11n-2w. The well flowed 140 bbl. of oil per day through 12/64-in. tubing choke from perforations at 6,535-6,607 ft. in the Pennsylvanian unconformity sand. Swabbing brought a flow of 293 bbl. per day after fracture treatment.

To the north at 1 Harkey, SW SW NW 7-11n-2w, also east of the Oklahoma City fault, Simmons has a Hunton lime strike. The well flowed 148 bbl. of oil per day through 14/64-in. choke from perforations at 6,500-16 ft.

Interest in this area directly east of Oklahoma City field on the downthrown side of the fault was revived last summer when R. W. Hibbert completed the discovery well of Southeast Oklahoma City field in 34-11n-2w for 96 bbl. of distillate and 35,000 M.c.f. of gas daily from perforations at 6,714-30 ft. in the basal Pennsylvanian sands. Magnolia Petroleum Co. later extended the new pool ½ mile north with another gas-distillate well in the unconformity sands. Jay Simmons found oil at 1 Trosper last summer in 18-11n-2w in the basal Pennsylvanian sands at approximately the same depth as the Wilcox on the west side of the fault in Oklahoma City field proper.

CALIFORNIA

West Cat Canyon Discovery Finaled as Small Pumper

A wildcat 1 mile northeast of West Cat Canyon field, Santa Barbara County, was completed as a small pumper in a Sisquoc zone of Pliocene age. The test, Slick Moorman Production Co. 22-A Palmer-Stendel in N½ 24-9n-33w, pumped 25 bbl. of 17.9°-gravity crude plus a 2.5 per cent cut.

Production was through perforations at 2,353-2,533 and 2,632-2,704 ft. The wildcat was drilled to 2,980 ft., with top of the Miocene called at 2,710 ft.

Six miles south of Zaca Creek field, in 19-7n-31w, The Texas Co. abandoned its 1 Caldac after setting 7-in. pipe at 2,359 ft. Swabbing yielded only sulfur water with specks of oil.

New Torrey Canyon Tests

Union Oil Co. has staked location for a 1-mile south outpost to its deep Sespe pool at Torrey Canyon, Ventura County. The wildcat will be 20 Simi in 8-3n-18w. Northwest of the 7-well pool ½ miles, The Texas Co. will drill 2 Hunter in search of the 7,000 to 10,000-ft. pay. Located in NE NE Section 6, the test will be about ¼ mile north of 1 Hunter which was dry at 10,150 ft.

Pipe Set on Eocene Test

Richfield Oil Corp. has set pipe in its Eocene test 3 miles southwest of the Wheeler Ridge-Eocene pool, southeast San Joaquin Valley. Bottomed at 14,238 ft. and plugged back to 13,190 ft., 2,340 ft. of blank and perforated liner was landed at 13,190 ft. and cemented through perforations at 11,331 ft. Results of any tests given the wildcat, 1 San Emidio-B in NE SW 36-11n-21w, have not been released by the operator.

Lost Hills Deep Test

Standard Oil Co. of California's deeper-pool discovery in Lost Hills field, Kern County, evidently will be completed as a small pumper. Following a flow test, 16 "well" died and pumping equipment was being installed. Production is from a Carneros

sand, topped at 6,022 ft., from a plugged-back depth of 6,050 ft.

Mountain View Activity

Nozu sand prospects on the west side of Mountain View production, east-side San Joaquin Valley, will be evaluated by three new wildcats. The deeper Miocene pay was discovered in April by M. J. M. & M. Oil Co. 3 Atlantic Wible in NW NE 23-30-28s, flowing 385 bbl. daily from 7,201-7,353 ft.

Pacific Western Oil Corp. was preparing to move in for its 1 Wible in NW 23. About 1 mile southeast of the discovery, Bysshe & Barratt staked 52-22 K.C.L. in NW NE Section 22, and in NE SE Section 9 Union Oil Co. will drill 86-9 Kernco.

New Castaic Hills Wildcat

M. J. M. & M. Oil Co. and Morton & Dolley will attempt to extend production at Castaic Hills, Los Angeles County, about ½ mile north, with 1 Hall. It will be a 4,500-ft. test in SW SE 26-5n-17w.

NEW MEXICO

SOUTHEAST NEW MEXICO

Chaves Wildcat Flows Oil

Forest Oil Corp. 1 Federal-General American, 8 miles northeast of production in Lightcap field, in 7-7s-31e, developed a flow of oil estimated up to 15 bbl. hourly from an unidentified formation at 7,754-7,888 ft. The flow was on a drill-stem test, on which gas surfaced in 7 minutes, mud in 27 and oil in 32 minutes. Flowing pressure reached 1,035 psi. and shut-in pressure was 2,770 psi. Operators were coring ahead below 7,890 ft. in limestone, thought to be basal Wolfcamp or the top of the Pennsylvanian.

Lea County... Continental Oil Co. 3 Anderson Ranch, northeast offset to the Devonian discovery well, flowed 60 bbl. of oil in 1 hour on drill-stem test of the Wolfcamp at 9,710-9,915 ft.

Humble Oil & Refining Co. will reenter Lawton Oil Corp. 3 State, dry hole southwest of Saunders pool, and deepen from old total depth of 13,139 ft. to 14,000 ft. to test the Devonian. Humble's operation will be designated 1-AE State.

Eddy County... Richardson & Bass 1 Cobb-Federal kicked off and flowed 60.6 bbl. of oil through ¼-in. choke in 10 hours, from perforations in the Delaware Mountain group between 7,003-16 and 7,022-35 ft. Plugged back depth was 7,163 ft.

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APPALACHIAN AREA

OHIO

S. & M. Oil & Gas, Inc., has completed a gas discovery in Athens County, Ohio, on the G. Y. Tedrow farm, Rome Township, Section 26. The well gaged 480 M.c.f. of gas in what is known as the Cow Run sand at a depth of 635 ft. with 305 psi. This well is located about 2 miles west of good Cow Run oil production.

MICHIGAN

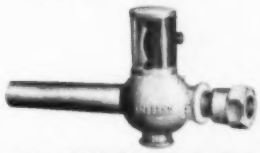
Lawton Traverse Pool Extended Further North

Ford Oil Co. extended Lawton Traverse oil pool, Porter Township, Van Buren County, further to the north with the completion of the 2 Spicer, NE NE SW 5-4s-13w. Well is located ½ mile due north of the nearest producer in the pool, and on the basis of preliminary tests appeared to be a good oil producer for this area.

Traverse lime was logged at 1,060 ft. and hole was bottomed out at 1,064 ft., total depth. Pay started to show at 1,062 ft. Well carried 50 ft. of free oil natural, with no water showing. After acid treatment with 1,000 gal. well flowed back 35 bbl. of net oil first hour and then went dead. Under agitation, daily production was reported to be from 60 to 70 bbl. of oil a day.

In a new west extension area to Bloomingdale Traverse oil pool, Columbia Township, Van Buren County, Orville Palmer reported

INTENSE HEAT!
NO SMOKE!



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Dilute a little CINDET in HARD or SOFT water... apply with clean mop... let foamy, clean-looking suds stand 5 or 10 minutes... scrub only if necessary, and rinse thoroughly. The result: AMAZINGLY BRIGHT, CLEAN FLOORING.

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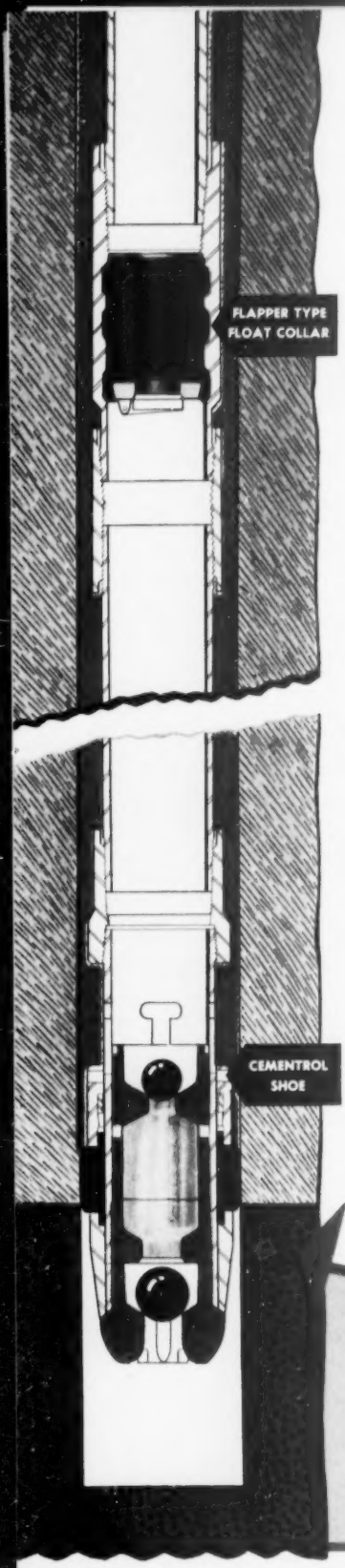
WESTPORT, CONNECTICUT



Cementrol

Patented, No. 2,488,819

prevents cement contamination of producing zones

● The Larkin Cementrol Float Shoe, by means of its hydraulically expanded neoprene packing element, provides the surest, most positive method of protecting prospective producing zones from cement contamination.

Thousands upon thousands of wells ranging in depth from the "grass roots" to over 13,000 feet are better producers because of Cementrol protection during the primary cementing operation.

You'll find all the operating details about Cementrol in your Composite Catalog, or write for your copy of the Larkin General Catalog.

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Cementrol Shoe in the "set" position

Cementrol Shoe in "Running-in" position

Illustrated above is a typical application of the Cementrol Shoe as used to protect exposed producing formation from cement contamination. Cement is shown in red.

Flapper Type Float Collar which allows passage of bridging ball

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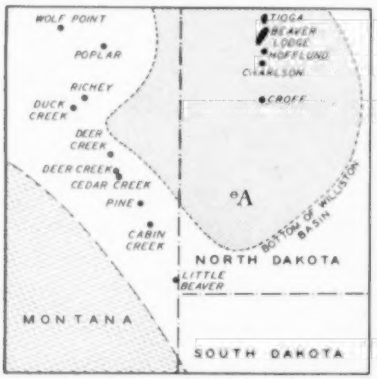
restricted flow of as much as 75 bbl. of oil a day from the 1 Rosevear, SW SE SW 10-1s-15w, the extension producer, after most recent reacidization with 1,000 gal. Well, which was bottomed out in the Traverse at 1,171 ft., was originally completed for about 25 bbl. of oil daily following first acid treatments.

ROCKY MOUNTAIN

NORTH DAKOTA

Amerada Testing Three North Dakota Discoveries

Amerada Petroleum Co. is currently testing three apparent discoveries in North Dakota. One of these is the company's first success outside the Nesson anticline area of the northwestern part of the state, and appears to be second major area discovery for



The most significant discovery in North Dakota since the Beaver Lodge strike is reported at Amerada Petroleum Corp. and Northern Pacific Railroad 1 May in the Fryburg area of Billings County. (A on map.) On 24-hour gage the discovery flowed 392 bbl. of 40°-gravity oil on ¾-in. choke. Gas-oil ratio is 500:1. The discovery is located 53 miles south of McKenzie County production and 50 miles east of Montana production. The 1 May is in the deeper part of the Williston basin and is the first test to be drilled off the Nesson anticline by Amerada.

the state. The other two apparent discoveries are within the general Nesson anticline area.

On production test of the Amerada and Northern Pacific Railroad 1 May, C NW NE 9-139n-100w, in the Fryburg area of Billings County, the recovery was 324 bbl. of 40.1°-gravity oil in 21 hours flowing through 24/64-in. choke. The flow at the end of the testing period was at the rate of 25 bbl. per hour. Test followed acidization of the Madison at 9,304-9,466 ft. with 5,000 gal. Top of the Madison has not been definitely established but is believed to be near 9,300 ft.

The flow of oil was accompanied by gas at the rate of 627 M.c.f. per day, with the flow diminishing to 256 M.c.f. per day at the end of the test. Operator plans to dig this well deeper.

The Fryburg area discovery is classified by observers as probably the most important in the North Dakota portion of the Williston basin since the original discovery in the state. It is about 53 miles south of southernmost production on the Nesson anticline in McKenzie County, and about 50 miles east of production on the Montana side of the basin. The wildcat is the only drilling within a radius of several miles. Stanolind Oil &

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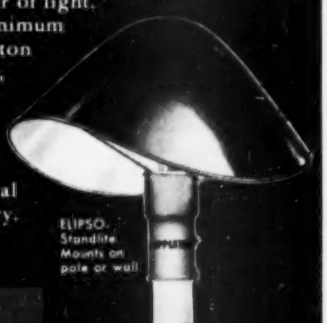

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Gas Co. and Deep Rock Oil Corp. drilled a dry hole 28 miles southeast of the apparent discovery in 1952, and although there were shows through the Mississippian section, commercial completion did not result.

The location was by seismic prospecting, and will help assure drilling of other highs known to have been mapped by other operators through the state.

The second current North Dakota discovery by Amerada is 1 Yttredahl, C SW NE 33-154n-95w, in northern McKenzie County. This well, though miles south of the Hofflund field, flowed 173 bbl. of oil and 32 of water in 24 hours from the Madison interval 8,246-8,300 ft. Casing has been run to 8,375 ft. and the operator is continuing to test. The discovery presents a peculiar problem in North Dakota production, since it is located in Missouri River bottoms which will be flooded with the filling of the new Garrison Dam reservoir.

A third discovery, between the Beaver Lodge and Tioga fields in Williams County, has been completed. The well is 1 Haustveit, C NW SE 23-157n-95w. It flowed 346 bbl. of oil and 39 of water through 20/64-in. choke in a 24-hour period. The nearest production in the Beaver Lodge field is 1¾ miles southeast of this discovery, and Tioga production is 2 miles north.

MONTANA

East Poplar Area Strike Flows at High Rate

Empire State Oil Co.'s 1 Smith "C," S½ SW SE 8-29n-51e, 2 miles north of production at the northern East Poplar area in Roosevelt County, flowed oil from two zones at the combined rate of 75 bbl. per hour. The well produced from 5,750-57, and 5,770-78 ft. after light acidization of both zones. Flow was through choke of undisclosed size.

Completions through East Poplar field have range from about 250 bbl. per day to 2,000 bbl. per day. The field is the most highly developed area on the Montana side of the Williston basin.

Operators are not yet sure whether the Empire State discovery opens a new pool, or will eventually be found to have extended previous producing areas to the north. The well is reported considerably lower structurally than those producing in the field proper. It is located on the northward-plunging north end of the Poplar anticline. Empire State is still testing at the wildcat without having established a completion gage.

WYOMING

West Sussex Wildcat Shows for Production

Earl Mallette, Casper independent recovered a reported 800 ft. of free oil on 1-hour drill-stem test of the interval 1,783-1,803 ft. at 1 Government, N½ SE SW 33-43n-80w, about 3 miles northwest of West Sussex field, Johnson County. While details are not yet released on the well, production is believed from the Shannon sand. Mallette has moved in tools for a second well in the area, and unofficial estimates of the potential of the discovery run as high as 500 bbl. per day. The wildcat is of considerable importance to further work along the very active southwest flank of the Powder River basin.

COLORADO

New Mesaverde Strike

Mountain Fuel Supply Co. has confirmed reports of a new discovery in Mesaverde sand at its 1 Unit, SE SW NE 9-11n-101w, in Moffat County. The well flowed on 90-minute drill-stem test with a maximum of 4,670 M.c.f. per day. Production is tentatively identified as from a Mesaverde sand. The operator drilled ahead to 5,256 ft. where other shows were encountered. Later shows have not been tested. The discovery is about 4 miles southwest of Hiawatha, where production is from Lance and Wasatch. There has been very little drilling done in the immediate area.

LOUISIANA

SOUTH LOUISIANA

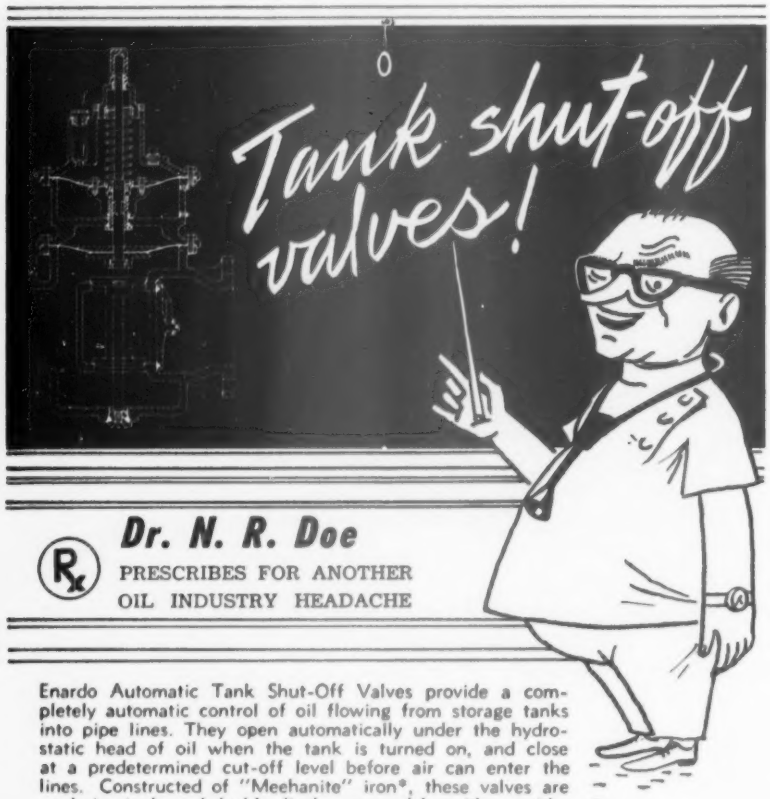
New Norco Field Extended Mile East by Third Well

Production of California Co.'s comparatively new Norco field, 15 miles west of New Orleans, in St. Charles Parish, has been extended nearly a mile to the east with the completion of the field's third well, 3 U.S.A., in 2-12s-8e.

The new producer flowed at an estimated rate of 8,900,000 cu. ft. of gas and 30 bbl. of 48°-gravity condensate daily through ⅛-in. choke. Tubing pressure gaged 3,350 psi.

Production is from casing perforations at 9,210-23 ft. in Miocene sand. Total depth is 11,600 ft.

The discovery well, 1 U.S.A., completed late in 1952, produces gas-distillate from a deeper sand, opposite which casing is perforated at 10,082-114 ft. The second well, 2 U.S.A., a mile east of the first well, produces



Dr. N. R. Doe
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Enardo Automatic Tank Shut-Off Valves provide a completely automatic control of oil flowing from storage tanks into pipe lines. They open automatically under the hydrostatic head of oil when the tank is turned on, and close at a predetermined cut-off level before air can enter the lines. Constructed of "Meehanite" iron*, these valves are made in single and double diaphragm models, with or without built-in swing type check valves to prevent oil back-up. Bulletin 9-01.
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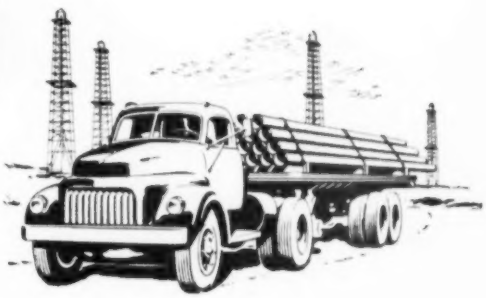

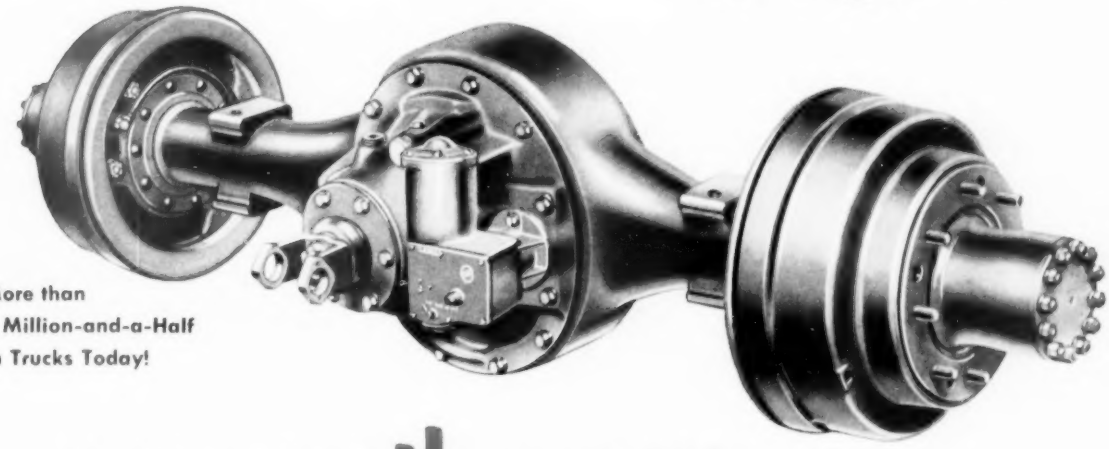

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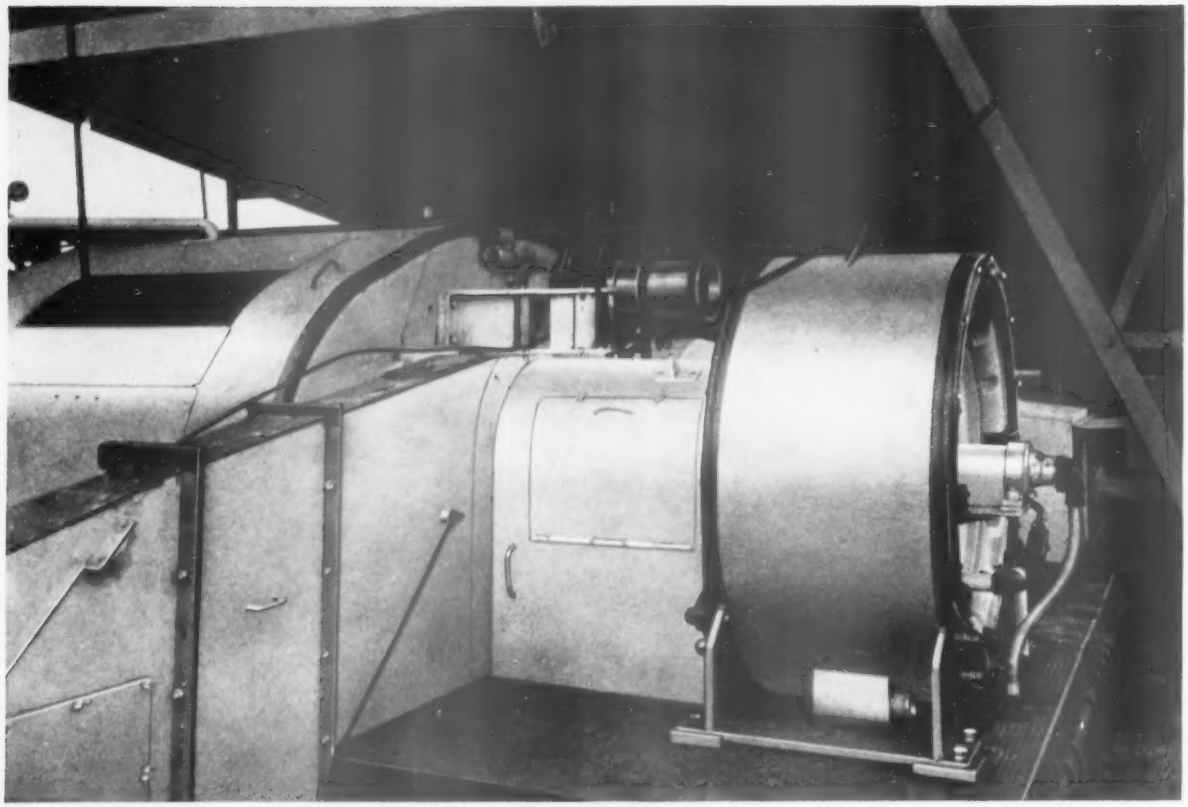

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from the 9,200-ft. sand with perforations at 9,236-45 ft. The new well is approximately a mile east of the latter.

New Production Opened In Mallard Bay Area

A new oil field has been opened by The Texas Co. in the Grand Lake area of northeastern Cameron Parish. The discovery well, 2 State-Mallard Bay, in 18-13s-3w, flowed 169 bbl. of 32.7°-gravity oil on a 24-hour gage through ⅛-in. choke with pressure of 975 psi. on the tubing, and gas-oil ratio of 381 cu. ft. per barrel. Production is from Miocene sand, opposite which casing is perforated at 6,092-6,110 ft. Hole is plugged back to the sand from total depth of 9,205 ft. and has casing run to 6,155 ft.

Location, in the Mallard Bay arm of Grand Lake, is approximately a mile east of the Grand Lake field, nearest production, and about 2½ miles northwest of the Mallard Bay field. The company's first test, 1 State-Mallard Bay, 2,950 ft. to the southwest, was dry.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Aransas County: Renwar Oil Corp. 5 State, Tract 105, Copana Bay. IP 168.65 BOPD, ⅛-in., 41.1°, casing perforations 7,835-39 ft. (Massive "I" sand). TD 9,100 ft. (New pay in West Fulton Beach field.)

Bell County: E. Signey Hughes 1 Hubbard, O. T. Taylor Sur. Dry. TD 1,340 ft. MacFoote, Inc., 1 Mason, A. Thompson Sur. Dry. TD 855 ft. in Eagleford.

Brooks County: Sinclair Oil & Gas Co. 1 Gruver, W. R. F. Thorn Sur. 8, A-521. Dry. TD 10,000 ft.

Duval County: Panhandle Oil Corp. 1-B Driscoll est., T&NO Sur. 6, A-1106. IP 9,700 M.c.f. daily, open flow, Cole sand 2,462-72 ft. (casing perforations). TD 2,674 ft. (New field—North Strake field.)

Frio County: Dallas Husky 1 Alamo National Bank, Rusk T. Sur. 1, A-518. Dry. TD 4,152 ft.

Guadalupe County: Pat H. Baker et al 1 R. A. Baker, Joel R. Robinson Sur. Dry. TD 2,605 ft. in Eagleford. Austin 2,400 ft., Eagleford 2,595 ft.

Lake Rice Mill, Inc., 1 Gerdes, R. M. Forbes Sur. Dry. TD 2,006 ft.

Lake Rice Mill, Inc., 1 Bon Stein, Thomas W. Symon Sur. Dry. TD 1,979 ft.

Hays County: A. E. Mabry et al 1 Ruby, Charles Henderson Sur. Dry. TD 871 ft.

Hidalgo County: Magnolia Petroleum Co. 1 Garza, San Salvador del Tule Grant, Parcel A. IP 12,000 M.c.f. daily, open flow, casing perforations 8,327-33 ft. TD 9,010 ft. (New field.)

Panacol Petroleum Corp. 1 Malone, Llana Grande Grant. Dry. TD 8,040 ft.

Neuces County: Southwestern Oil & Refining Co. 1-D State, Cayo del Oso Sur. IP 32,000 M.c.f. daily, open flow, casing perforations 6,665-68 ft. TD 6,844 ft. (New field—Cayo del Oso.)

San Patricio County: Feland & Gainer 1 Davis, George Sargent Sur., Share 3, A-231 (North Gregory area). Dry. TD 9,620 ft.

Pan American Production Co. 1 Brown, J & N Delgaga Grant. Dry. TD 5,601 ft.

Plymouth Oil Co. 12-B Welder, Welder Ranch Subd. IP 28,500 M.c.f. daily, open flow, with 51 BC per million cubic feet daily, casing perforations 7,644-48 ft. (tubing completion); and 31,800 M.c.f. daily open flow, with 41 BC per million cubic feet gas, casing perforations 7,393-97 ft. (casing completion). TD 8,005 ft. (New field—North pasture.)

Starr County: Sun Oil Co. 7 J. M. de la Garza, Santa Teresa Grant. IP 12,700 M.c.f. daily, open flow, casing perforations 5,004-14 ft. TD 5,795 ft. (New pay in North Sun field.)

Webb County: G. C. Mortimer, Jr., and W. Earl Rowe 1 Kirkpatrick, CCSD&RGNG Sur. 17. Dry. TD 4,332 ft.

Standard Oil Co. of Texas 1 Rosa V de Benavides et al, J. Cuellar Sur. Dry. TD 6,910 ft.

TEXAS GULF COAST

Brazoria County: Republic Natural Gas Co. 1 State, Tract 8, Bastrop Bay. Dry. TD 7,164 ft.

Burleson County: Carl O. Keels 1 Cornish, Abner Smith Sur. Shut down. TD 3,515 ft.

Colorado County: Los Nietos Co. 1 Johnson, Roland Thompson Sur., A-548. Dry. TD 9,000 ft.

DeWitt County: Ada Oil Co. 1 Cook, Williams Arrington Lge., A-51. Dry. TD 8,638 ft.

Goliad County: Morris Cannan et al 1 Gladys Powell Key et al, Williams D. Sutherland Sur., A-268. IP 56,500 M.c.f. daily, open flow, with spray of condensate (unestimated), 54.2°, Carrizo-Wilcox 7,558-63 ft. (casing perforations). TD 7,781 ft. (New field.)

Carnes W. Weaver 1 Ideus, Graviel Casias Sur., A-94. IP 98 BOPD, ⅛-in., casing perforations 7,622-26 ft. TD 7,805 ft. (New field.)

Sun Oil Co. 5 Albrecht, Vicente Ramos Sur., A-243. Dry. TD 4,270 ft.

Sun Oil Co. 1 Neal, Maria de Jesus y Barbo Sur. Dry. TD 8,600 ft.

Liberty County: General Crude Oil Co. 1 Langham et al, Davis Cole Sur., A-161. Dry. TD 8,554 ft.

Live Oak County: F. W. Carr 1 Harman, Ed Ramirez Sur. 15, A-393. Dry. TD 4,311 ft.

Polk County: Albert Plummer 1 Pearce, L. Castillian Sur., A-162. Dry. TD 7,024 ft.

Victoria County: C. G. Dunwoody 1 H. R. Smith est., Decidero Garcia Lge., A-38. Dry. TD 6,202 ft.

Wharton County: Trans-Tex Transmission Co. 1 Wallace, J. A. Hamilton Sur. 40, A-580. IP 60,000 M.c.f. daily, open flow, casing perforations 2,777-85 ft. TD 5,124 ft. (New pay in Trans-Tex field.)

EAST TEXAS

Freestone County: A. O. Phillips 1 Cora Longbotham, R. S. Longbotham Sur., A-16. Dry. TD 4,055 ft.

Van Zandt County: British American Oil Producing Co. 1 Teague, C. A. Lovejoy Sur., A-492. Dry. TD 4,502 ft.

W. H. Bryant 1 A. H. McKibben, Anthony Gray Sur., A-290. Dry. TD 5,515 ft.

Wise Drilling Account 1 George Wilderspin, BBB&C Sur., A-105. Dry. TD 5,463 ft.

WEST CENTRAL TEXAS

Coleman County: A. L. Andree 1 Mrs. Willie Stobaugh, 21-1-GH&H. Dry. TD 2,849 ft.

Sid Katz 1 Daisye Edmunson, Sec. 260, F. Johnson Sur. Dry. TD 2,500 ft.

Sid Katz 1 G. W. Scott, 91-1-GH&H. Dry. TD 2,802 ft.

Vega Corp. 1 F. A. Windham, Sec. 103, GH&H. Dry. TD 3,529 ft.

Yeatman Drilling Co. 1 Ben F. Dunn, M. D. J. Trevino Sur. 669. Dry. TD 2,672 ft.

Eastland County: Connally-Jackson 1 Walker Estate, 87-3-H&TC. Dry. TD 3,995 ft., elev. 1,616 ft., Ellenburger 3,992 ft.

Duquesne Oil Corp. 1 J. M. Radford, 8-4-H&TC. Dry. TD 4,047 ft., elev. 1,593 ft., Mississippian 3,956 ft., Ellenburger 4,033 ft.

Fisher County: Rankin & Pitcock 1 A. J. Griffen, Blk. 29, James Leggett Subd., A. J. Long Ranch. Dry. TD 3,370 ft.

Skelly Oil Co. 1 Agnes Swann, R. S. Spires Sur. 283. Dry. TD 5,490 ft.

West Central Drilling Co. 1 A. W. Canfil, 4-2-H&TC. IPP 41 BOPD, 38°, Canyon sand 4,997-5,008 ft. TD 5,995 ft.

Haskell County: Thos. D. Humphrey & Sons 1-B Collins, Blk. 159, H. Fischer Sur., A-133. Dry. TD 4,231 ft.

Jones County: Jones & Stasney et al 1 W. J. Bryan, Sec. 40, BBB&C. Dry. TD 4,925 ft.

Lake Production Corp. 1 A. F. Gentry, 72-1-BBB&C. Dry. TD 3,160 ft.

J. F. Sadler 1 Anna Stuart, Sec. 12, Blind Asylum Lands Sur. Dry. TD 4,200 ft.

Three Bros. Oil Co. 1 L. C. Breland, 98-1-BBB&C. Dry. TD 3,103 ft.

T. A. Kirk 1 J. W. Lynch, 42-20-T&P. IP 149 BOPD, ½-in., 44°, pay 6,065 ft. TD 6,117 ft.

Shackelford County: W. A. Moncrief and B. C. McMordie 1 Hendricks Estate, Sec. 156, ETRR. Dry. TD 1,425 ft.

Don H. Peaker 1 B. E. Snyder, Sec. 26, Asylum Lands Sur. Dry. TD 4,305 ft.

Stephens County: W. J. Rhodes 1-A Moon Ranch, 21-5-T&P. Dry. TD 4,399 ft., elev. 1,282 ft., Ellenburger 4,384 ft.

Stonewall County: Edgar Davis Drilling Co. 2 Arthur Brinkley, 314-9-AB&M. Dry. TD 6,083 ft.

Donald C. Grange 1 J. W. Kennedy, 172-1-H&TC. Dry. TD 5,635 ft.

Taylor County: Mid-Continent Petroleum Corp. 1 Florence Spencer, J. R. Munson Sur. 412. Dry. TD 4,516 ft.

Throckmorton County: E. R. Perkins 1 H. W. Schlittler, Sec. 2218, TE&L. Dry. TD 4,768 ft.

NORTH TEXAS

Archer County: Archer Drilling & Production Co. 3 Turbeville, T. P. Glass Sur., A-69. IPP 56 BOPD, pay 1,287 ft. TD 1,289 ft.

C. O. Bridges 1 J. B. Miller, Blk. 21, ATNCL Sur. IPP 46 BOPD, pay 905 ft. TD 918 ft.

L. T. Burns 1 Dycus Estate, TE&L Sur. 1895, A-575. Dry. TD 4,106 ft.

T. B. Cochran 1-B Abercrombie, Blk. 23, Harris Subd., SPRR Sur., A-923. Dry. TD 1,475 ft.

Luke Grace Drilling Co. 1 C. W. Thomas, Nathan Thomas Sur., A-454. Dry. TD 3,751 ft.

J. Earle Gray 1 J. T. Richardson, W. McCune Sur., A-943. Dry. TD 1,241 ft.

Bull Oil Co. 2-C Fred Daume, SPRR Sur. 1, A-422. Dry. TD 691 ft.

Baylor County: Bander & Couch 1 Simon Bartosh, 47-45-H&TC. Dry. TD 1,510 ft.

Burk Royalty Co. 1 F. C. Green, J. E. Hix Sur. IP 137 BOPD, 6/64-in., Chappel limestone 5,402 ft. TD 5,429 ft.

Clay County: Harvey Drilling Co. 1 Fuller Lease, Lot 5, H. Dixon Sur., A-106. Dry. TD 4,815 ft.

Grayson County: Howell, Holloway & Howell 1 Barney Vanston, Sarah Shoto Sur., A-1079. Dry. TD 4,889 ft. in dolomite.

Shell Oil Co. 1 J. S. Brookshear, J. Armendarius Sur. Dry. TD 5,675 ft.

Jack County: M. E. Andrews and American Drilling Corp. 2 Dodson, G. W. Stell Sur., A-529. Dry. TD 2,610 ft.

Midland Oil Corp. 2 Midland-Morris, H. Martin Sur., A-383. Dry. TD 5,450 ft.

Neeld & Hood Drilling Co. 2-D Prideaux, SPRR Sur., A-577. IPP 16 BOPD, pay 584 ft. TD 593 ft.

WILDCAT COMPLETIONS

Montague County: S. D. Johnson 1 W. S. Barcus, Sec. 54, MEP&P Sur. Dry. TD 5,719 ft., elev. 995 ft., Caddo 5,296 ft.

W. T. Waggoner Estate 1 McCall & Fooshee, J. Ollibarri Sur., A-579. Dry. TD 6,336 ft.

Wichita County: G. W. Cooper 2 J. C. Jennings, 8-A475-HT&B. Dry. TD 1,704 ft.

Wilbarger County: Wm. L. Snoddy 1 George Streit, 9-18-H&TC. Dry. TD 2,100 ft.

Frank Wood 1 W. T. Waggoner, "Waco." 22-4-H&TC. Dry. TD 2,503 ft.

Young County: R. W. Darden 1 J. R. Barnett, Sec. 186, TE&L. Dry. TD 1,062 ft.

Hayden Farmer 1 M. V. Wolverton, Blk. 225, TE&L. Dry. TD 998 ft.

T. F. Hunter Estate 1 J. W. Dudley, I&GN Sur., A-1326. Dry. TD 4,551 ft., Mississippian 4,539 ft.

S. D. Johnson 1 Alexander Estate, N. Lynch Sur., A-172. Dry. TD 4,195 ft.

Star Oil Co. 1 Hockaday Ranch, R. Mabry Sur., A-2288. IP 58 BOPD, 9/64-in., 41°, pay 3,233 ft., TD 3,239 ft.

Woodson Oil Co. 1 J. W. Taylor, Wm. Bragg Sur., A-50. Dry. TD 4,694 ft.

WEST TEXAS

Andrews County: Herman Brown 1 Maggie Endora Mann, 18-A23-PSL. IP 125 BOPD, ½-in., 34°, Clear Fork 6,377 ft. TD 6,417 ft.

Coke County: J. J. Lynn 1 Oscar Krasta, Chas. Flores Sur. 1005. Dry. TD 6,023 ft., Strawn 5,409 ft.

Crockett County: Sinclair Oil & Gas 1 University-Crockett 112, 24-7-University. Dry. TD 9,062 ft.

Culberson County: G. E. Seals 1 Gulf-Grisham-Hunter, 42-54-PSL. Dry. TD 2,251 ft., elev. 3,634 ft., Delaware sand 2,110 ft.

Dickens County: Skelly Oil Co. 1 Beggs Ranch, 246-F-H&TC. TD 6,995 ft., elev. 1,885 ft., Mississippian 6,590 ft., Cambrian 6,850 ft., Hickory 6,950 ft.

Ector County: V. A. Brill 1-A David Fasken, 32-42-T1N-G&MMB&A. Dry. TD 13,663 ft., elev. 3,016 ft., Devonian 11,702 ft., Mississippian 11,345 ft., Silurian 12,420 ft., Simpson 13,030 ft., Ellenburger 13,508 ft.

Cities Production Corp. 1-Q Cowden, 9-43-T2S-T&P. Dry. TD 13,777 ft., elev. 2,975 ft., Pennsylvanian 8,512 ft., Devonian 11,538 ft., Ellenburger 13,860 ft.

Howard County: Cosden Petroleum Co. 1 D. D. Crawford, 47-32-T1N-T&P. Dry. TD 9,826 ft., elev. 2,454 ft., Pennsylvanian 8,905 ft., Ellenburger 9,720 ft.

Pecos County: Wm. P. Penn 1 F. H. Perry, 6-2-TCRR. Dry. TD 1,639 ft.

Reagan County: Phillip R. Johnson 1 O. H. Walters, Sec. 1, Cert. 5036, GC&SF. IPP 17 BOPD, 30°, pay 2,342 ft. TD 2,434 ft.

C. L. Norsworthy Jr. 1 V. J. Powell, 21-A-AB&M. IP 136 BOPD, 36°, Canyon sand 3,560 ft. TD 4,800 ft.

Runnels County: Hickok & Reynolds, Inc. 1 Belle Syler, A. J. Rober Sur. 44½. Dry. TD 4,705 ft.

Fidelity Oil & Royalty Co. 1 M. H. Vancil, Sec. 26, H&GN. Dry. TD 4,798 ft.

Scurry County: General Crude Oil Co. 1 A. C. Martin, 189-97-H&TC. Dry. TD 7,824 ft.

Tom Green County: J. Marvin Rape 1 J. M. Rape, C. E. Locke Sur. 2. Dry. TD 461 ft.

Morris G. Spencer & L. J. Montgomery 2 Washington CSL, Block 106, Washington CSL Sur. Dry. TD 5,556 ft., elev. 1,924 ft., reef 5,388 ft.

Sinclair Oil & Gas Co. 1 R. L. Stansberry, 61-25-H&TC. Dry. TD 5,805 ft., elev. 2,350 ft., Strawn 5,450 ft.

Upton County: Sinclair 1 J. P. Rankin, 32-41-T5S-T&P. Dry. TD 11,628 ft., elev. 2,850 ft., Strawn 10,006 ft., Devonian 11,583 ft.

Winkler County: Charles F. Garlitz 2 Ida Hendricks, 37-27-PSL. Dry. TD 3,475 ft.

Western Drilling Co. and Tobe Foster 1-B Dixon, 608-D. J. H. Gibson Sur. Dry. TD 5,315 ft.

SOUTHEAST NEW MEXICO

Chaves County: Westcoast Hydrocarbons, Inc. 1 Black Hills Unit, 28-12s-20e. Dry. TD 5,612 ft., elev. 4,768 ft., Fusselman 4,790 ft., Ellenburger 5,312 ft.

Eddy County: DeKalb Agricultural Association 1 Shugart, 30-16s-26e. Dry. TD 6,620 ft.

Lea County: McAlester Fuel Co. 1 CP State, 14-13s-37e. Dry. TD 9,946 ft., elev. 3,884 ft., Wolfcamp 9,510 ft.

ILLINOIS

Clay County: Marvin & Steber 1 Anderson, NW SE NW 15-3n-5e. Dry. TD 3,000 ft.

Clinton County: E. A. Obering 1 Beckemeyer, SW NW SW 33-3n-2w. Dry. TD 1,420 ft.

F. L. Goldsmith 1 Wegman, SE SE NW 33-3n-3w. Dry. TD 1,022 ft.

T. M. Pruett 1 Mueller, NE NE SW 28-2n-2w. Dry. TD 1,335 ft.

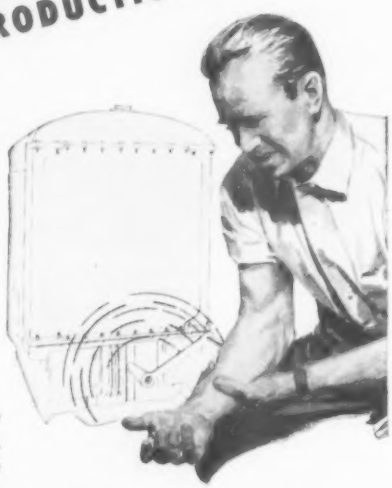
Effingham County: Roc-Ser Corp. 1 Hartke, SE SW NW 9-7n-7e. Dry. TD 2,723 ft.

Fayette County: M. Smith 1 Dively, SE NW NW 14-7n-2e. Dry. TD 2,095 ft.

Lawrence County: Sun Drilling Co. 1 Douglas-Newman, NW SW NW 8-3n-13w. Dry. TD 2,799 ft.

STOP CRANK "KICK BACK" MISERY
STOP TIME, PRODUCTION LOSSES

WITH THE Safety Crank



Crank "kick-back" accidents are impossible with a SAFETY CRANK. The crank's mechanism will allow it to turn only *one way*. If the engine "kicks back" the crank jams instantly... will not permit the handle to whip back even a hundredth of an inch. Compression shock is taken up by the SAFETY CRANK'S friction clutch.

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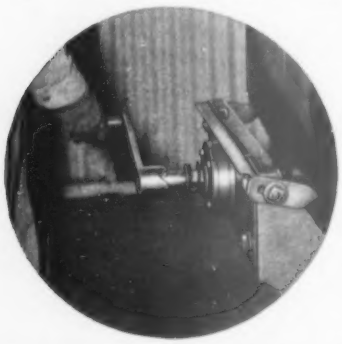

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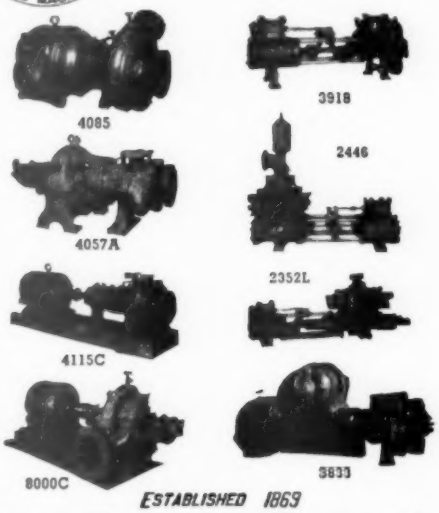

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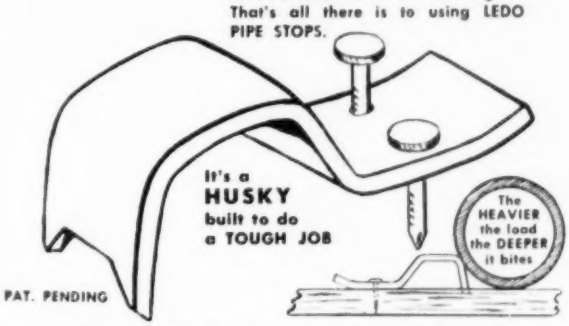

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TRIANGLE JACK CO., INC.
Manufacturers Box 2034 Wichita, Kan.

WILDCAT COMPLETIONS

Richland County: N. V. Duncan 1 Holtz, SW SE SE 9-4n-10e. Dry. TD 3,103 ft.

Washington County: Leo Horton 1 Friend, NE NW SE 30-3s-2w. Dry. TD 1,316 ft.

White County: Whaley Oil Corp. 1 Johnson, SE SW SW 12-4s-10e. Dry. TD 3,231 ft.

Rock Hill Oil Co. 1 Hoosier, NW SW NW 7-5s-10e. Dry. TD 3,342 ft.

INDIANA

Parke County: C. L. Lawhead 1 S. Lane Commission, SW NE NW 35-14n-8w. Dry. TD 1,490 ft.

Spencer County: G. Pool 1 White, NW SW NE 29-6s-5w. Dry. TD 1,288 ft.

T. W. Drake 1 Raven, N½ SE SW 3-5s-5w. Dry. TD 1,585 ft.

L. Harris 1 Mitchell, NE SE NW 4-4s-5w. Dry. TD 1,130 ft.

Vanderburgh County: Calvert Drilling Co. 1-A Roeder, SE NW NW 12-6s-11w. Dry. TD 1,151 ft.

KENTUCKY

Henderson County: Barron Kidd 1 Crafton, NW SE NW 12-Q-20. Dry. TD 2,792 ft.

McLean County: George S. Engle 1 Jackson, NE NE SE 15-N-25. IPP 12 BOPD, Tar sand 1,727-48 ft. TD 1,748 ft. Extension to Eastwood Ferry pool.

Producers Pipeline-R. E. Hupp 1 Coke-Gish, SE SE NW 18-L-29. Dry. TD 2,079 ft.

Muhlenberg County: Cory Oil Co. 1 McPherson, NW NE NW 2-G-30. Dry. TD 950 ft.

Ohio County: W. E. Daily 3 Cox-Kirtley, NW SE SE 17-M-30. Dry. TD 985 ft.

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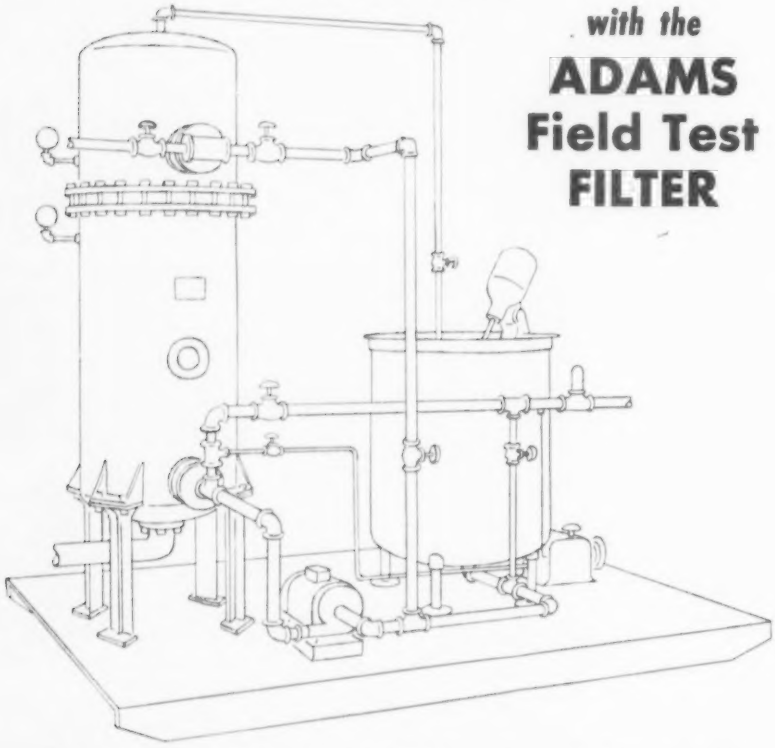

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MICHIGAN

Allegan County: P. K. Degenther 1 U. S. A., NW NE NE 24-3n-14w. Dry. TD 1,619 ft. in Traverse.

R. D. Evans & Sons 1 Moore, SW SW NW 35-3n-13w. Dry. TD 1,662 ft. in Traverse.

Gratiot County: Associated Drillers & Producers, Inc., 1 Green, SE SE SW 13-10n-2w. Dry. TD 844 ft. in Michigan Stray sand.

Lapeer County: White, Whitaker & White 1 Butterfield, SE SE SE 17-9n-10e. Dry. TD 1,470 ft. in Berea.

*Montcalm County: Wm. B. Darke 1 Webster, SE NW SW 22-10n-6w. IPP 15 BOPD, Traverse 2,779 ft., pay 2,810-12 ft. TD 2,812 ft. (New pool).

Montcalm County: Socony-Vacuum Oil Co., Inc., 1 Fahrner, NE NE NW 5-12n-5w. Dry. TD 3,551 ft. in Dundee.

Muskegon County: H. J. Hirzel 1 Boy Scout Camp Corp., NE NW SE 15-11n-18w. Dry. TD 1,670 ft. in Traverse.

Osceola County: Mogul Oil Co. 1 State-Orient, NW NW SW 22-17n-7w. Dry. TD 3,860 ft. in Dundee.

Ottawa County: Socony-Vacuum Oil Co., Inc., L. Warnke, SE NW SE 26-8n-15w. Dry. TD 2,175 ft. in Dundee.

St. Clair County: Panhandle Eastern Pipeline Co. 1 Woehlert, C NW 29-4n-15e. Dry. TD 2,870 ft. in Niagaran.

ALABAMA

Covington County: Lyle Cashion Co. et al 1 Evers, C SW SW 25-3n-16e. Dry. TD 4,517 ft. Elev. 257 ft., Chalk 1,775 ft., Eutaw 3,208 ft., marine Tuscaloosa 3,900 ft., lower Tuscaloosa 4,098 ft., lower Cretaceous 4,275 ft.

MISSISSIPPI

Jefferson County: R. H. Alagood and Lyle Cashion Co. 1 Truly, 3-8n-1e. Dry. TD 6,030 ft. Elev. 274 ft., Sparta 2,534 ft., Wilcox 3,888 ft., Artman sand 5,593 ft.

Madison County: Lamar Hunt Trust est., 1 Finnie, 32-9n-3e. Dry. TD 6,315 ft. Elev. 239 ft., Wilcox 1,559 ft., Midway 3,871 ft., Eutaw 5,257 ft.

Wilkinson County: B. Serio et al 1 Strickler, 16-3n-3w. Dry. TD 7,750 ft. Elev. 157 ft., Sparta 4,241 ft., Wilcox 5,354 ft., base Baker shale 7,129 ft.

Atlantic Refining Co. 1 Wax-Morgan, 22-3n-3w. Dry. TD 7,499 ft.

SOUTH LOUISIANA

Assumption Parish: Jake L. Hamon 1 Robichaux, 129-14s-15e. Dry. TD 12,521 ft.

Jefferson Parish: F. A. Callery, Inc., 1 Jones et al., 2-17s-24e. (North Lafitte area.) Dry. TD 11,030 ft.

Plaquemines Parish: Southern Production Co., Inc., 1 State Lease 2122, Tract 5035. Dry. TD 9,378 ft.

Southern Production Co., Inc., 1 State Lease 2123, Tract 5038. Dry. TD 9,606 ft.

Kerr-McGee Oil Industries, Inc., 1 State Lease 1261, Block 21, Main Pass area. Dry. TD 3,252 ft. (Core test.)

Kerr-McGee Oil Industries, Inc., 2 State Lease 1218, Block 17, Breton Sound area. Dry. TD 3,252 ft. (Core test.)

Kerr-McGee Oil Industries, Inc., 2 State Lease 1219, Block 18, Breton Sound area. Dry. TD 3,240 ft. (Core test.)

Kerr-McGee Oil Industries, Inc., 3 State Lease 1219, Block 18, Breton Sound area. Dry. TD 3,200 ft. (Core test.)

Kerr-McGee Oil Industries, Inc., 4 State Lease 1219, Block 18, Breton Sound area. Dry. TD 3,200 ft. (Core test.)

Kerr-McGee Oil Industries, Inc., 5 State Lease 1219, Block 18, Breton Sound area. Dry. TD 3,250 ft. (Core test.)

Kerr-McGee Oil Industries, Inc., 1 State

Lease 1220, Block 19, Breton Sound area. Dry. TD 3,250 ft. (Core test.)
Kerr-McGee Oil Industries, Inc., 1 State Lease 1225, Block 30, Breton Sound area. Dry. TD 3,250 ft. (Core test.)
Kerr-McGee Oil Industries, Inc., 3 State Lease 1220, Block 19, Breton Sound area. Dry. TD 3,250 ft. (Core test.)
Kerr-McGee Oil Industries, Inc., 4 State Lease 1220, Block 19, Breton Sound area. Dry. TD 3,250 ft. (Core test.)
Kerr-McGee Oil Industries, Inc., 3 State Lease 1503, Block 31, Breton Sound area. Dry. TD 3,200 ft. (Core test.)
St. Bernard Parish: The Texas Co. 1 State Lease 2168, Township 12s-17e, in False Mouth Bay. Dry. TD 11,389 ft.
St. Charles Parish: Gulf Refining Co. 65 Delta, 14-15s-21e. IP 18 BCPD and 1,574 M.c.f. daily, 12/64-in., 44.7°, casing perforations 8,284-8,334 ft. TD 8,787 ft. (New pay in Bayou Couba field.)
St. Landry Parish: Sohio Petroleum Co. and Gulf Refining Co. 1 Lionel Quirk, 44-4s-4e. IP 20 BCPD and 1,000 M.c.f. daily, ⅝-in., casing perforations 9,143-49½ ft. TD 9,150 ft. (Extends, and new pay in Washington field.)
BBM Drilling Co. 1 Lazara et al., 40-4s-3e. Dry. TD 9,400 ft.
St. Mary Parish: Pure Oil Co. 6-A State Lease 832, Block 32, Eugene Island area, Gulf of Mexico. IP 152 BCPD and 5,784 M.c.f. daily, 9/64-in., casing perforations 10,662-84 ft., 10,700-20 ft., and 10,728-36 ft. TD 12,358 ft. (New pay in Eugene Island Block 32 field.)

NORTH LOUISIANA

Bossier Parish: Sunray Oil Corp. et al 1 Roberts, C NE SE 33-22n-12w. Dry. TD 10,115 ft.
Webster Parish: John B. Stephens et al 2 Grafton, 2,850 ft. N and 2,310 ft. E of SWc 2-23n-11w. IPP 60 BOPD, Pettit 5,910-15, 5,934-38, 9,944-50, 5,960-70, 5,978-84 ft. TD 6,189 ft. (New pay at Springhill.)

ARKANSAS

Drew County: Union Producing Co. 1 Crossett Lumber Co. "H," 660 ft. S and 456 ft. W of NEc SE 34-13s-7w. Dry. TD 4,202 ft.
Ouachita County: Garland Anthony et al 1 Graves, C NW NW 17-14s-18w. Dry. TD 2,100 ft.
Union County: Leonard W. Phillips et al 1 Bishop, C NE SE 25-16s-17w. IPP 109 BOPD, 25.8°, Smackover lime 6,398-6,400, 6,400-6,403 ft. TD 6,403 ft. (Opens Camp Creek pool).
Marine Oil Co. 1 Lee, C NE NW NE 26-17s-13w. Dry. TD 4,493 ft.

OKLAHOMA

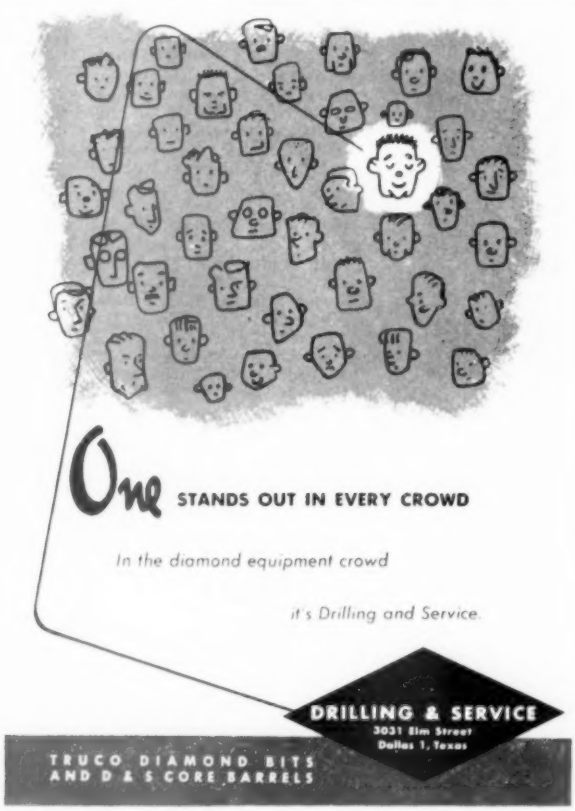
Cimarron County: Cities Service Oil Co. 1 Ferguson "B," SE SE NW 13-5n-9eCM. IP 12,100 M.c.f. of gas per day, 4,218-50, 4,498-4,508 ft. Morrow and Keyes sand. TD 4,662 ft.
Cities Service 1 Ford "B," SE SE NW 34-6n-9eCM. IP 26,650 M.c.f. of gas per day, 4,610-70 ft. TD 4,720 ft.
Cleveland County: Ohio Oil Co. 1 Ellis, NE SW NE 12-8n-1e. Dry. TD 6,336 ft.
Cotton County: Erle P. Halliburton 1 Ace-Vo-Ni, SE NE SE 13-1s-10w. Dry. TD 2,422 ft.
Creek County: Kidd Williams Drilling Corp. 1 Horn, NE SW NW 31-18n-5e. Dry. TD 2,711 ft.
Garfield County: Kingwood Oil Co. 1 C. L. and B. M. Thompson, NW NW SW 17-24n-4w. Dry. TD 6,302 ft.
Garvin County: Anderson-Prichard Oil Corp. 1 Bennett, NW NE SW 26-1n-3w. Dry. TD 2,617 ft.

WILDCAT COMPLETIONS

Stewart & Green 1 Howell, NW NW NW SW 27-1n-1e. Dry. TD 1,703 ft.
Wm. H. Pine 1 Archer, SW NW NW 34-4n-3e. Dry. TD 2,257 ft.
Hughes County: W. A. Delaney, Jr., 1 Cates, NW SW NW 4-5n-9e. Dry. TD 3,502 ft.
Kay County: Fleet Drilling Co. 1 School Land, SW SE SE 16-28n-2w. Dry. TD 4,596 ft.
Lincoln County: Mid-Continent Petroleum Corp. 1 First National Bank of Grove, SE SE NW 34-13n-4e. Dry. TD 5,419 ft.
Davidor & Davidor 1 Muzny, SW NW SW 25-13n-5e. IPP 40 BOPD, 28°, Viola and dolomite 4,455-89, 4,505-33 ft. TD 4,585 ft. (Viola extension discovery.)
McCurtain County: J. M. Eastman 1 Tuchstone, C NE SE 23-6s-24e. Dry. TD 311 ft.
Major County: Altus Drilling Co. 1 Munkres, NW NW 16-20n-9w. Dry. TD 8,720 ft. second Wilcox 8,677 ft.
Noble County: Deep Rock Oil Corp. 1 Miller "A," NW SE NE 26-22n-1w. IPP 34 BOPD, Mississippi lime 4,765-71 ft. TD 5,105 ft.
Osage County: Halbert & Evans 1 Osage, NW NW SE 6-23n-4e. Dry. TD 4,066 ft.
Payne County: Fordee-Rhodes and Berry 1 Matthews-Kliesen, NW NW SW 19-19n-2e. Dry. TD 4,956 ft.
Pontotoc County: Jefferson, Cooper & Donaldson 1 Breco, NE SW NE 32-4n-7e. Dry. TD 1,940 ft.

KANSAS

Barton County: Duke & Wood 1 Nicholet, SE SE SW 5-20s-13w. Dry. TD 3,515 ft.
Great Bend Brick & Tile 1 Werhahn, SE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THE OIL AND GAS JOURNAL

"... and when he rings, you better be on the run."

WILDCAT COMPLETIONS

NW SE 28-19s-15w. Dry. TD 3,649 ft.
Ellis County: Petroleum, Inc., 1 Reitmeyer, NE SW NE 29-12s-20w. Dry. TD 3,891 ft.
Gove County: Anschutz Drilling Co. 1 Theis Bros., SW SW SW 24-15s-30w. Dry. TD 4,507 ft.
Greenwood County: White & Ellis-Saturn 1 Christy, NW SW NE 3-24s-9e. Dry. TD 2,331 ft.
Marion County: El Dorado 1 Slocomb, NE SW SW 19-22s-4e. Dry. TD 2,583 ft.
Pawnee County: A. F. Braun 1 Fox, NE NE NE 36-20s-19w. Dry. TD 4,158 ft.
Rush County: Morrison 1 Eilts, NW NW SE 24-19s-19e. Dry. TD 4,184 ft.
Stafford County: Westgate-Greenland-Sinclair 1 Estes, NE SE NW 5-22s-14w. IPP 1,921 BOPD, Arbuckle 3,850-63 ft. TD 3,872 ft. (Opens Radium townsite pool.)
El Dorado 1 McCune, NW NW SE 3-25s-11w. Dry. TD 4,097 ft.

NEBRASKA

Cheyenne County: Superior Oil Co. 62-13 Anderson, SE NW NE 13-13n-53w. Dry. TD 5,497 ft.

NORTH DAKOTA

Bottineau County: Calvert Exploration and Don Traders, Inc., 1 Carbonneau, C NW NW 28-162n-74w. Dry. TD 3,864 ft. Duperow 3,842 ft.
Rolette County: T. M. Evans 1 Andy Johnson, C NW SW 23-160n-70w. Dry. TD 4,948 ft. pre-Cambrian 4,947 ft.

CALIFORNIA

Butte County: Cherokee Oil Co. 1 Openshaw, 3-20n-3e. Dry. TD 934 ft.
Kern County: H. L. Whiston, Sr., 1 Tieck, 13-29s-27e. Dry. Fairhaven 2,577 ft. TD 2,655 ft.
Standard Oil Co. 47 Stalder, 12-11n-23w. Dry. TD 7,924 ft.
Kings County: W. W. Holmes, Opr. 1-19 "Well," 19-23s-22e. Dry. TD 3,600 ft.
Los Angeles County: Union Oil Co. 3-49 Horse Meadows, 4-2n-16w. Dry. TD 6,235 ft.
Orange County: Standard Oil Co. 1 Wagner Comm., 29-3s-9w. Dry. TD 2,501 ft.
San Joaquin County: Union Oil Co. 1 Union-Brazos-Balcao, 25-2n-7e. Dry. TD 6,602 ft.
Santa Barbara County: Richfield Oil Corp. C-5 Russell, 9-10n-26w. Dry. TD 9,808 ft.
Amerada Petroleum Corp. 1 Gauld, 12-6n-31w. Dry. TD 3,054 ft.
Ventura County: Standard Oil Co. C-1 State, 35-2n-23w. IPF 330 BOPD, 34/64-in., 18.4°, perforations 12,318-12,518 ft. TD 12,543 ft. (West extension to Colonia pool of Montalvo field.)
Yolo County: Ohio Oil Co. 1 A. H. Rominger, NW SW 4-8n-1w. IP 3,100 M.c.f. daily, 18/64-in., perforations 3,575-3,588 ft. in Cretaceous. TD 3,641 ft. (New field discovery located 1¼ miles NE of Pleasant Creek field.)

MONTANA

Wheatland County: Continental Oil Co. 1 NPRR, SE SE NE 9-9n-17e. Dry. TD 7,766 ft. Cambrian 7,732 ft.

WYOMING

Big Horn County: Gulf Oil Corp. 1 Emmett, C SW SW 13-52n-94w. Dry. TD 11,968 ft. Madison 11,810 ft.
Marsh & Pursel 1 Government-McMahon, NE SE SW 15-55n-97w. Dry. TD 4,686 ft. Mowry 4,641 ft.
Delhi Oil and Delta Drilling Co. 1 Oborne, SE Lot 37-16-56n-97w. Dry. TD 4,887 ft. Peay 3,412 ft.
Carbon County: Continental Oil Co. 1 Unit, NE NE NE 20-18n-88w. Dry. TD 2,603 ft. Tensleep 2,432 ft.
Fremont County: Sinclair Oil & Gas Co. 1 Unit, SW SE SW 21-33n-95w. IPF 136 BOPD, 40.4°, 10,734-52 ft. TD 11,500 ft. PBTD 10,818 ft. Tensleep discovery, new field. Madison 11,393 ft.
Sinclair Oil & Gas Co. 1 Jade Unit, SE SE SW 3-28n-93w. Dry. TD 5,100 ft. basal Morrison 5,064 ft.
Johnson County: Fred Manning 1-"A" Crawford Gordon, NW NE SE 13-45n-83w. Dry. TD 2,670 ft. Tensleep 2,192 ft.
J. Ray McDermott 1 Government, SE SW NW 21-47n-81w. Dry. TD 8,760 ft. Shannon 8,705 ft.
Natrona County: Chicago Corp-Republic Natural Gas Co. 1 Government, NE NE NW 34-33n-77w. Dry. TD 4,315 ft. Lakota 4,295 ft.
Washakie County: Hiawatha Oil & Gas Co. 1-31 Government, NE NE NE 31-43n-89w. Dry. TD 5,026 ft. Madison 4,652 ft.

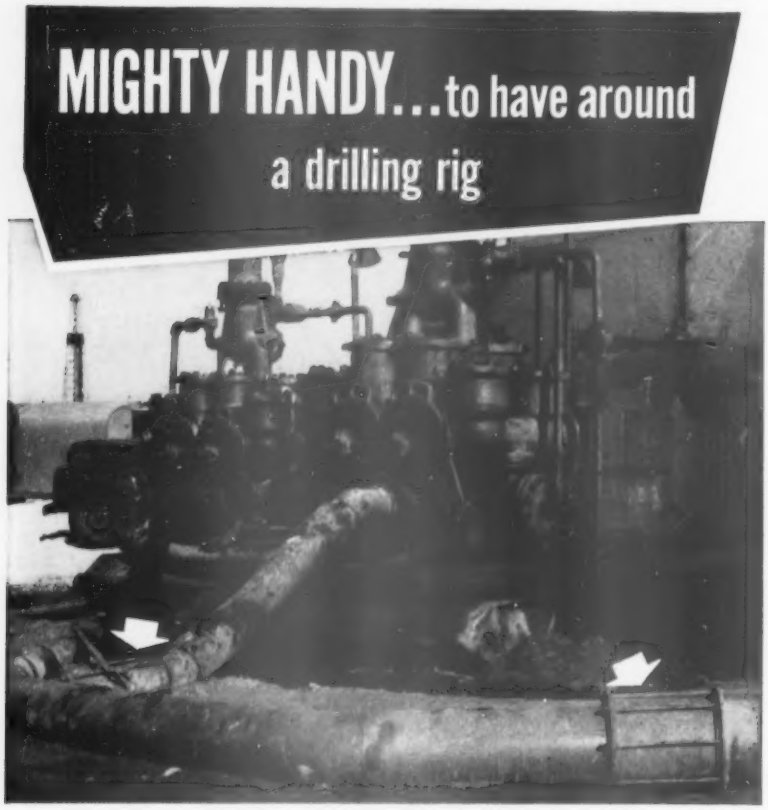
COLORADO

Logan County: Falcon Seaboard and Allied Materials Corp. 1 Thompson, SE SE SE 7-8n-54w. IPF 276 BOPD, 24/64-in., TD 5,500 ft. "J" sand 5,381 ft. ("J" sand oil discovery, new field.)
The Texas Co. 1 State "A," NW SE SW 20-7n-51w. Dry. TD 4,706 ft.
L. W. Winkler & Son and Ute Royalty Corp. 1 State, NW SW SW 24-8n-51w. Dry. TD 4,656 ft.

NORTHERN NEW MEXICO

Sandoval County: F. Kelly 1 State, C NW NE 32-18n-4w. Dry. TD 3,776 ft. Morrison 3,650 ft.

(Continued on page 167)



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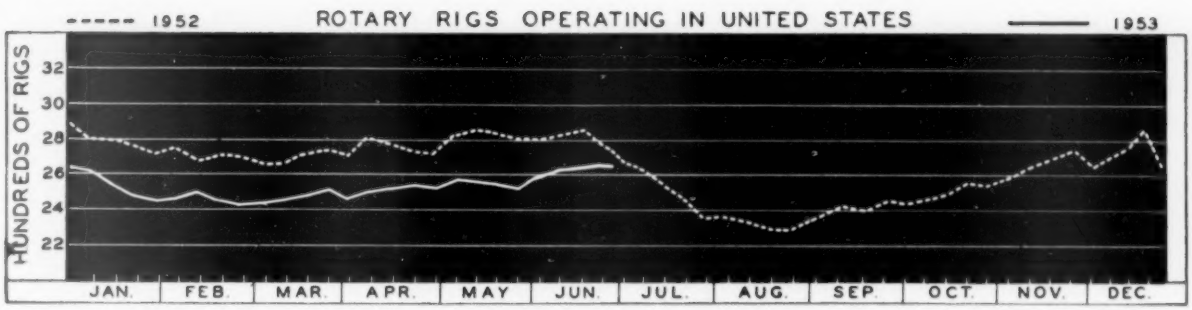
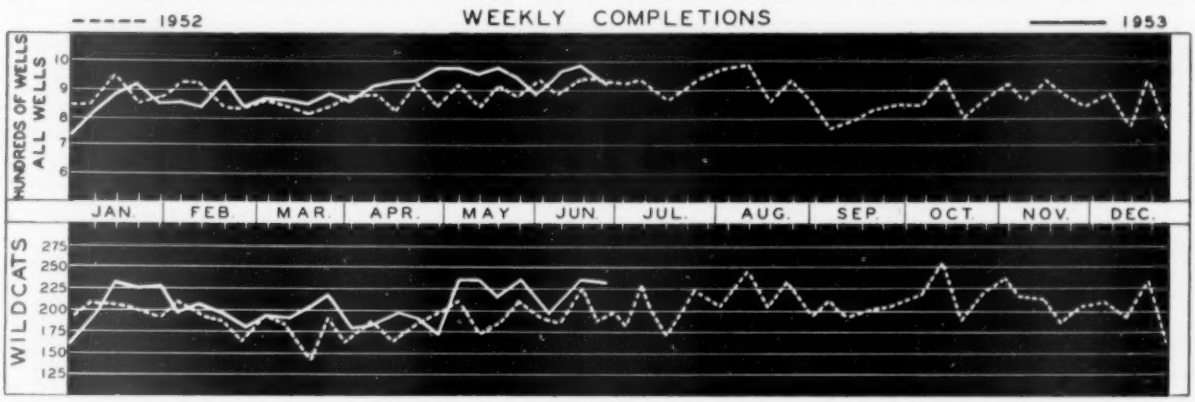




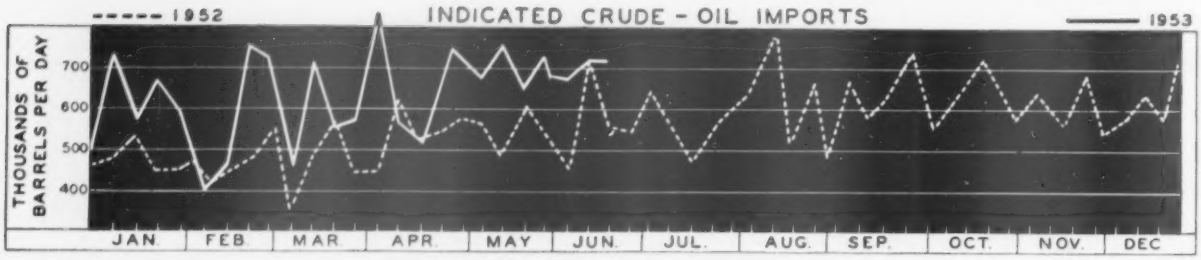
CURRENT STATISTICS

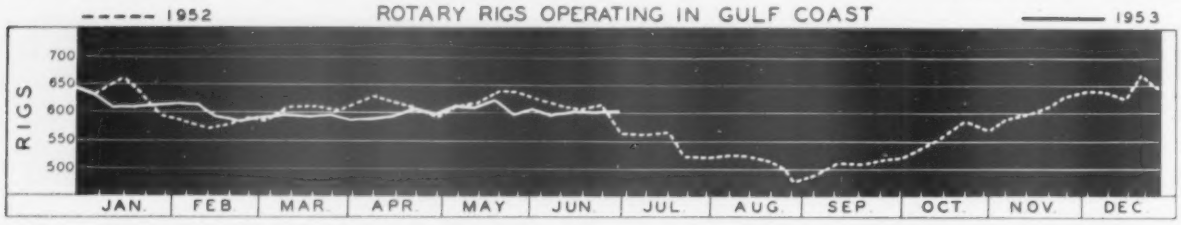
EXPLORATION

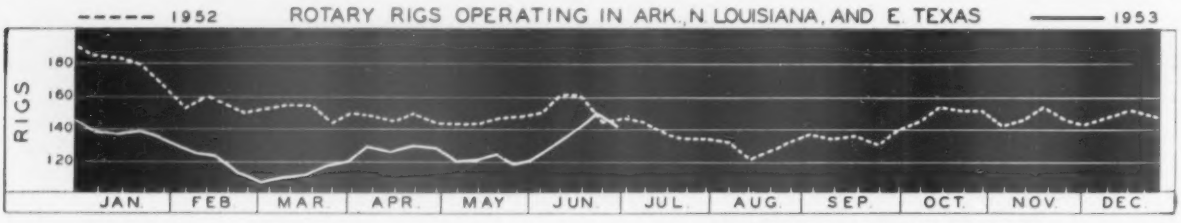
WEEKLY WELL COMPLETIONS . . .WEEK ENDED JUNE 27, 1953

	Total of all wells					June 27		Wildcat completions and discoveries										
													Cumulative total, 1953					
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	21,600	334	384	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	17	3	†12	55,450	822	858	0	0	0	0	0	0	0	3	8	11
West Virginia	16	5	9	2	42,940	287	299	0	0	0	0	0	0	0	4	3	7
Ohio	22	11	7	‡4	47,007	485	494	0	0	0	0	0	1	0	1	10	12
Indiana	32	8	0	24	49,865	584	565	0	0	0	5	5	8	0	2	142	152
Kentucky	21	5	4	12	43,263	509	648	1	0	1	4	6	6	0	1	92	99
Illinois	34	13	0	21	90,907	853	821	0	0	0	11	11	3	0	0	184	187
Michigan	16	4	0	12	40,311	264	331	1	0	0	9	10	9	0	4	105	118
Kansas	64	24	3	‡37	208,569	2,379	2,339	1	0	0	10	11	56	0	19	372	447
Nebraska	4	2	0	2	24,474	152	119	0	0	0	1	1	12	0	2	66	80
Oklahoma	115	69	3	§43	392,738	3,453	2,894	2	0	2	15	19	56	4	17	318	395
Texas	351	176	22	153	1,579,586	8,393	8,970	12	2	5	86	105	423	32	98	2,035	2,588
North Central (Dist. 7-B & 9)	163	85	1	77	562,213	3,089	2,819	7	0	0	42	49	226	0	10	821	1,057
West (Dist. 7-C & 8)	61	32	1	28	339,308	1,823	2,816	3	0	0	17	20	81	2	6	324	413
Panhandle (Dist. 10)	14	7	7	0	46,863	400	327	0	0	0	0	0	0	2	0	14	16
Eastern (Dist. 5 & 6)	20	7	3	10	117,971	403	441	0	0	0	4	4	12	2	3	135	152
Gulf Coast (Dist. 2 & 3)	47	26	3	18	293,389	1,246	1,317	1	1	1	10	13	54	10	41	320	425
Southwest (Dist. 1 & 4)	46	19	7	20	219,842	1,432	1,250	1	1	4	13	19	50	16	38	421	525
Louisiana	63	27	3	33	421,926	1,227	1,105	1	3	0	18	22	32	16	11	175	234
Northern	25	17	1	7	99,039	484	583	1	0	0	1	2	4	1	2	57	64
Southern	38	10	2	26	322,887	743	522	0	3	0	17	20	28	15	9	118	170
Arkansas	11	5	0	6	38,047	212	193	1	0	0	3	4	6	0	0	42	48
Mississippi	8	0	1	7	51,175	177	178	0	0	0	4	4	9	0	3	84	96
Southeastern States	1	0	0	1	4,517	67	31	0	0	0	1	1	1	0	0	51	52
Montana	5	4	0	1	18,426	176	115	0	0	0	1	1	3	0	0	44	47
Wyoming	31	17	0	14	180,185	309	318	1	0	0	9	10	10	0	0	52	62
Colorado	6	2	2	2	25,769	264	203	1	0	0	2	3	14	0	8	125	147
Utah	1	0	0	1	5,825	35	30	0	0	0	0	0	2	0	0	22	24
New Mexico	26	8	13	5	136,003	643	494	0	0	0	4	4	8	0	7	61	76
California	37	27	1	9	171,532	1,245	1,234	1	0	1	9	11	27	0	4	283	314
North Dakota	8	6	0	2	58,733	124	23	0	0	0	2	2	3	0	0	23	26
Miscellaneous	0	0	0	0	0	26	40	0	0	0	0	0	1	0	0	21	22
Total United States	918	437	71	410	3,708,848	23,020	22,686	22	5	9	194	230	690	52	184	4,318	5,244
Total previous week	995	538	61	396	4,049,628			35	3	6	194	238	668	47	175	4,124	5,014
Total June 28, 1952	931	503	71	357	3,854,916			30	0	11	156	197	696	48	125	3,976	4,845

Service wells included: *7, †11, ‡2, §1.



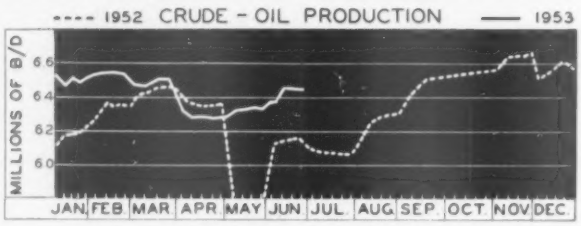


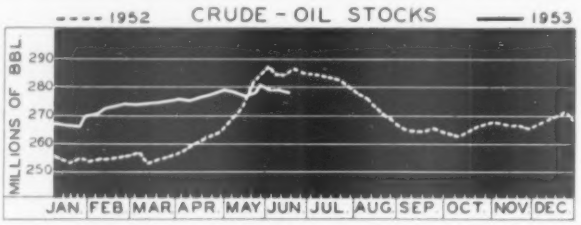


DAILY AVERAGE PRODUCTION FOR WEEK

	June 27 Crude oil	June 27 Lease condensate	June 27 Total	June 20 total
Alabama	4,900		4,900	5,000
Arkansas	77,900	650	78,550	77,750
California	1,014,700		1,014,700	1,016,100
Colorado	102,700		102,700	102,500
Eastern	59,000		59,000	58,900
Florida	1,550		1,550	1,450
Illinois	161,500		161,500	163,600
Indiana	35,700		35,700	35,900
Kansas	316,400		316,400	324,200
Kentucky	30,400		30,400	30,400
Louisiana	665,950	37,400	703,350	703,050
North	111,600	2,400	114,000	113,700
South	554,350	35,000	589,350	589,350
Michigan	33,900		33,900	34,300
Mississippi	93,450	4,050	97,500	97,700
Montana	30,600		30,600	31,000
Nebraska	13,400		13,400	13,700
New Mexico	194,975	950	195,925	195,925
Oklahoma	538,900		538,900	532,700
Texas	2,760,825	44,525	2,805,350	2,805,350
Dist. 1	36,300	400	36,700	36,700
Dist. 2	153,800	5,850	159,650	159,650
Dist. 3	447,175	22,700	469,875	469,875
Dist. 4	258,950	5,650	264,600	264,600
Dist. 5	48,750	350	49,100	49,100
Dist. 6	121,475	5,200	126,675	126,675
East Texas field	253,000		253,000	253,000
Dist. 7-B	115,900	50	115,950	115,950
Dist. 7-C	162,075	3,650	165,725	165,725
Dist. 8	910,800	200	911,000	911,000
Dist. 9	177,500	450	177,950	177,950
Dist. 10	75,100	25	75,125	75,125
Utah	5,400		5,400	5,300
Wyoming	209,200		209,200	210,500
North Dakota	14,500		14,500	14,600
Total U. S.	6,365,850	87,575	6,453,425	6,459,925
Change from previous week, down			6,500	
Canada	250,100		250,100	242,550
Total U. S. production January 1-June 27			1,143,877,425 bbl.	
Same period last year (crude plus cond.)			*1,094,017,250 bbl.	

*Includes 15,880,935 bbl. condensate.



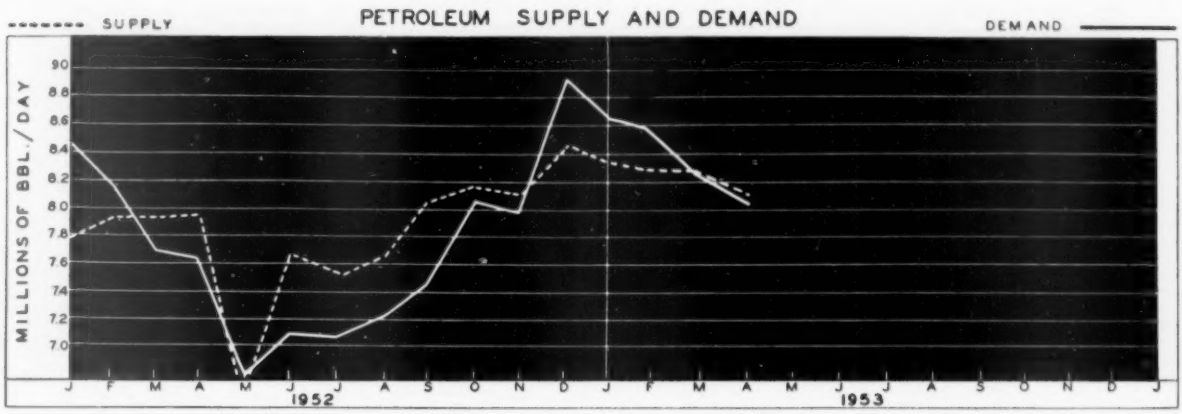


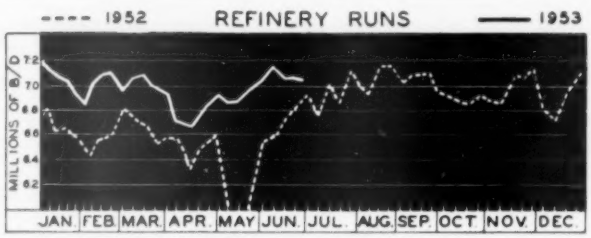
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

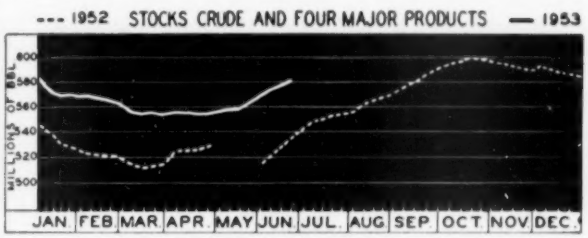
(Thousands of barrels)

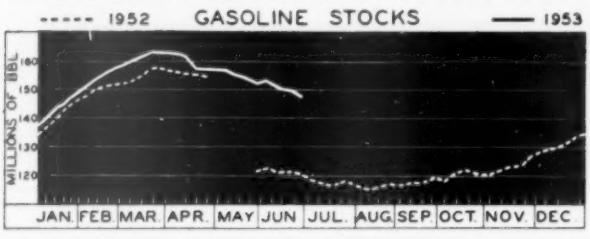
	June 20, '53	June 13, '53	June 21, '52
Pennsylvania Grade	2,648	2,640	2,527
Other Appalachian	2,410	2,293	2,086
Illinois, Indiana, Michigan	11,918	11,858	12,924
Arkansas	2,698	2,697	3,269
Louisiana	15,740	15,828	15,182
North	2,574	2,585	2,621
Gulf	13,166	13,243	12,561
Mississippi	3,762	3,752	3,427
New Mexico	7,293	7,198	7,618
Oklahoma and Kansas	39,037	39,462	43,691
Texas	131,247	132,398	142,653
East Texas proper	10,891	11,158	14,512
West Texas	61,894	62,189	60,860
Texas Gulf	25,977	26,335	31,953
Other Texas	32,485	32,716	35,328
Rocky Mountain	17,581	17,639	15,161
California	32,861	32,461	30,957
Foreign	†11,348	10,734	8,150
Total	278,543	278,960	287,645

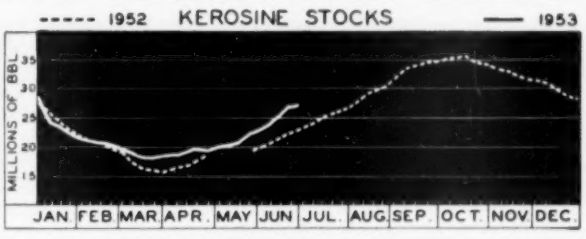
*Bureau of Mines. †Includes 2,535,000 bbl. in California.

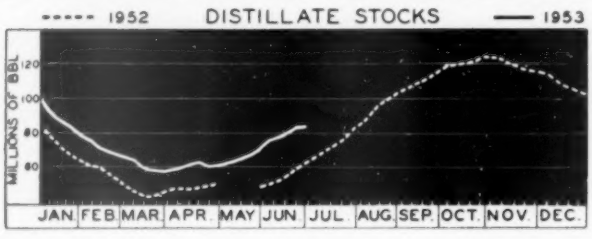


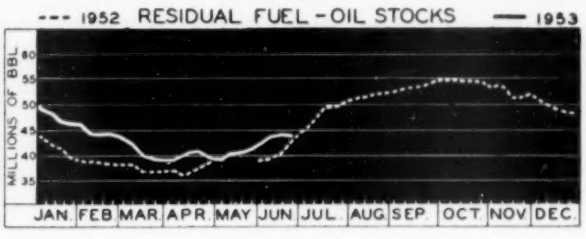










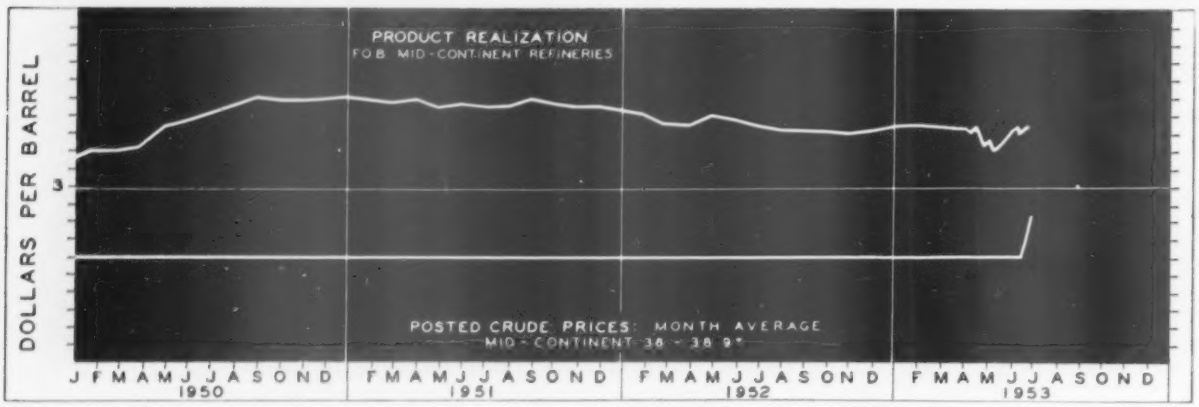


A.P.I. REFINERY REPORT, JUNE 27

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, June 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,034	419.1	30.0	247.1	254.9	33,756	11,398	26,687	11,038	1,125	419.0	35.7	256.1	240.1
Appalachian:														
District 1	110	48.4	5.7	19.4	15.3	3,608	528	804	541	110	48.0	4.6	14.5	13.2
District 2	96	44.7	7.6	14.3	14.3	1,402	345	417	153	77	38.4	2.0	12.9	12.3
Ind., Ill., Ky.	1,239	680.8	72.7	202.2	164.7	29,150	5,241	13,069	3,586	1,240	659.8	67.5	230.8	156.4
Okla., Kans., Mo.	635	375.7	21.6	169.3	50.4	15,043	1,754	9,420	1,216	540	294.9	15.6	126.6	51.8
Inland Texas	279	177.0	10.3	48.3	39.4	5,998	471	1,499	1,278	271	171.9	11.1	44.8	41.2
Texas Gulf Coast	1,692	836.0	147.0	399.3	254.0	20,860	3,746	12,146	6,695	1,603	717.6	118.0	418.9	259.5
La. Gulf Coast	590	288.6	43.3	146.0	47.6	7,126	2,292	5,214	1,371	538	236.8	45.3	132.3	52.8
N. La. and Ark.	87	32.6	7.2	25.4	9.9	3,155	481	830	109	85	32.8	6.5	19.4	5.8
Rocky Mountain:														
New Mexico	19	11.9		3.0	3.7	195		36	29	18	10.9	.3	2.9	4.2
Other Rocky Mtn.	235	114.9	3.4	49.1	40.0	6,288	260	2,022	1,053	235	110.8	6.3	45.1	40.9
California	1,031	480.4	4.1	151.7	367.8	20,384	440	10,841	16,702	983	428.3	4.4	150.4	349.4
June 27, 1953	7,047	3,510.1	352.9	1,475.1	1,262.0	146,965	26,956	82,985	43,771	6,825	3,169.2	317.3	1,454.7	1,227.6
June 20, 1953	7,063	3,363.1	338.7	1,443.1	1,243.0	149,535	26,586	82,701	43,937					
June 28, 1952	6,949	3,253.1	344.1	1,438.0	1,283.9	120,902	22,338	64,143	44,972					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.36 for week ended June 20, $3.31 for previous week, and $3.39 for June 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of July 1, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11⅜-11⅝	13.5-13.8	11.5-11.75
Premium gasoline	12⅜-12⅞	14.5-14.8	12.5-12.75
42-44 w.w. kerosine	9-9.25	10.15-10.75	9.5
No. 2 straw fuel oil	8-8.25	9.15-9.75	8.5
No. 6 residual	$1.00-1.20	$2.25-2.40	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.60	6.10	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12
750 vis., No. 3-4 neutral	15
2,000 No. 5-6 neutral	17

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19.5-20.5
200 vis., No. 3 neutral, 0-10 pp.	13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	25.5
180 vis., 10 p.t. neutral	27.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

PETROLEUM product prices were still unsettled at the end of June with most of the price variations reported for light fuels.

In the New York Harbor area spot buyers of kerosine and No. 2 fuel were still bidding 8.9 cents a gallon for barge delivery of No. 2 fuel. Material was reported available at the old posting of 9.65 cents less 0.5 cent for summer sales. Most of the major suppliers met the new price increase of 0.6 cent a gallon which with the summer discount results in a net price of 9.75 cents for No. 2 and 10.75 cents for kerosine. No actual spot sales were reported at these prices, but these top quotations will apply to most contract sales.

Suppliers in the Mid-Continent area report very slow movement of light heating oils following the price increase. Some of the large jobbers are not convinced that the new price level can be maintained through the summer months, particularly on light fuels. These buyers do not expect further increases in fuel prices before the heating season. In general, they feel that there is a better chance for a price decrease than for higher prices. As a result, some of them are not buying for storage at this time. This attitude will be reflected in primary stock increases.

Most of the activity on inland distillate markets has been confined to preliminary bargaining by some of the larger jobbers in northern states for light fuels to cover next winter's demand. At the present, most of them are holding bids down to the Group 3 low plus pipe-line transportation.

General quotations for gasoline in the Mid-Conitnent are up a cent a gallon, but over a period of time the increase will average much less. Some of the tank-wagon increases in the North Central states west of the Mississippi were less than 0.5 cent a gallon. These smaller increases may influence spot prices.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices after increase effective June 15, 1953. General increase was $0.25 but some Gulf Coast crudes were up $0.35.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Pecos County (Yates)	2.57
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.40
Southwest Pennsylvania	3.97
West Virginia	3.91
Illinois Basin	3.02

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EQUIPMENT FOR SALE

FOR SALE: 10,000'—4½" drill pipe, with tool joints cut off, located at Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

FOR SALE

SUPERIOR HEAVY DUTY DIESEL

510 hp. at 360 r.p.m.—5 cylinder—14½x18 type ZDSB — non-reversing — vertical—4 cycle—cold starting—mechanical injection. Engine is totally enclosed. Complete with a 48" 7 groove V-belt sheave and new spare parts. For heavy duty pumping, dredge service, power generation, textile and saw mills, mining, etc. EXCELLENT CONDITION, IMMEDIATE DELIVERY.

G. M. 3-71 DIESEL GEN. SET

30 kw. 2 cylinder 4½x5 diesel—radiator cooled—electric starting. Delco 3/60/440 generator — with switchgear. Skid mounted. Portable.

30 KW SHEPPARD DIESEL SETS

30 kw. Sheppard—115 volts DC—radiator cooled . Built 1950. Excellent condition. Self-mounted radiator and fuel tank. 16 units available.

75 KW WAUKESHA DIESEL GENERATOR SET

75 kw.—230 volts DC—totally enclosed, self-contained. Waukesha 6 cyl., 160 hp., 1200 r.p.m. diesel driving 75 kw. 1200 r.p.m. G. M. marine type generator. Self-contained switchboard and radiator.

100 KW G. M. 3-268A A.C. DIESEL GENERATOR SETS

440 volts—3 phase—60 cycle. 20 kw. D.C. generator on same shaft—5 kw. exciter —120 volts D.C.—electric starting.

LORIMER SLOW SPEED 100 KW A.C. DIESEL GENERATOR SET

Slow speed heavy duty unit. 150 hp.—5 cyl.—4 cycle—720 r.p.m.—electric starting—Ross heat exchanger—engine operating panel. Allis-Chalmers generator—100 kw.—440/3/60—80% PF—cubicle deadfront switchgear. Can quote with radiator if desired.

300 KW G. M. D.C. DIESEL SET

ENGINE: G.M. 8-268A—6½x7—1200 r.p.m. —air starting. GENERATOR: 300 kw. G.E.—120/240 volts D.C.—3 wire—totally enclosed—Marine type BB—with switchgear.

ELECTRIC WINCHES

Single drum—50 hp. 230 volt D.C. motors —built-in controls.

STEAM TURBO-GENERATOR SETS

300 kw—120/240 volts D.C.—1200 r.p.m. —1250 amps.—turbine W.P., 225 lbs. to 440 lbs.

MARINE SURFACE CONDENSERS

1050 sq. ft.—3000 sq. ft.

THE BOSTON METALS CO.
313 E. BALTIMORE ST.
BALTIMORE 2, MARYLAND
CURTIS 7-5050

EQUIPMENT FOR SALE

ONE COMPLETE GM Quad in good running condition. Recently overhauled. 60 injectors. $3,800 FOB Seattle. Evans Engine & Equipment Co., 1230 Westlake North, Seattle.

FOR SALE: Bettis 40 hp. steamer and equipment. Arnold E. Fox, 4756 North Seneca, Wichita, Kansas.

FOR SALE: In Oklahoma three single Reduction Gear Units, one Type 50 Lufkin, one National H-60 and one National H-6. Cities Service Oil Co., Patridge, Bartlesville, Okla.

JOY 300 Drilling Rig butane powered, mounted on Brockaway 6x6 truck, 3500 feet 3½ inch drill pipe. Auxiliary mud pump and butane engine as separate unit. All tools and equipment included. This rig in first-class working condition and ready to go to work immediately. Call or write Steele Brothers, Crete, Nebraska. Phone 127.

FOR SALE

GOOD USED CAST IRON FLANGED GATE VALVES

26—30" Rising Stem
5—30" Non Rising Stem
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65—42" Rising Stem
1—48" Rising Stem
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NEW STEEL PIPE

24" O.D. .281 wall 6,000 feet
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All 40 foot lengths

Small size pipe and tubing also available.

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ATwater 9305

EQUIPMENT FOR SALE

NEW LEE C. MOORE 100' Cantilever Mast for sale. 18' x 40' 9" base. 510,000#. Herman Graham Drilling Co., Salem, Ill.

USED ROTARY, cable tools, and production equipment. E. A. Kelly, 3131 S.E. 29th Street, P. O. Box 861, Oklahoma City. Phone Jackson 56407.

1000'—14" OD x .119 lbs. per ft. x 20' random length, H. R. seamless steel tubing. Box G-562, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1 Farrel-Birmingham Type SI-148 Speed Increaser, right-hand assembly, Top Spray, 300 HP, 900 to 3623 RPM, 4.025/1 Ratio, Cooler and Pump Assembly—New. Price $3,000 f.o.b. Oklahoma City. Address inquiry George Gentry, Room 546 Adams Building, Phillips Petroleum Company, Bartlesville, Oklahoma.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

5—55,000 bbl., 1—25,000 bbl., 10—10,000 bbl., 4—5,000 bbl. tanks, all standard specifications, all steel roofs, all bottoms thoroughly cleaned, located Wichita, Kansas, sell standing or cut down, loaded on cars.

50,000 ft.—6⅝" OD, Schedule 40, seamless, 18.97 weight line pipe, cleaned, beveled and primed, 80% Range 2, 20% Range 1, guaranteed same as new every respect, located Cleveland, Oklahoma.

Ph. 3-6141 W. C. BERRY Box 1858 Tulsa

FOR SALE
DIESELS AND PUMPS

Two new 1947 unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, each connected to Worthington Horizontal Triplex Double Acting Pump, both units with Falk Couplings and other accessories. Location Ohio, immediate delivery. Direct inquiries to

THE BUCKEYE PIPE LINE CO.
Joseph Steele, Purchasing Agent
Room 2200, 30 Broad St.
New York 4, N. Y.

FOR SALE

Complete National 100 Rig including 3 PTD-6 Superior Diesel Engines with dual fuel equipment, 136' Lee C. Moore Mast with 8' substructure, 2 C-350 Ideal Power Pumps, Ideal Type 548 TC Traveling Block, Type R3 Swivel, and Type MS-20½ Rotary Table. Excellent condition, priced reasonable, located in Montana. Complete inventory upon request.

Box G-341

The Oil and Gas Journal,
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: 1 Wilson Atlas Draw Works, Serial #6245. 2 G.A.K. Waukesha engines, completely overhauled with all new parts. A-1 condition. Makin Drilling Company, Box No. 1628, Phone 3-3141, Hobbs, New Mexico.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

HYDRAULIC Casing Pulling Machine. This rig has been used only two (2) months, and is very attractively priced. Contact C. E. Knight, Box 1688, Snyder, Texas. Ph. 3-6646.

FOR SALE: 48L Bucyrus-Erie Spudder completely rebuilt. New Model 6-WAKU Engine and Starting Motor. Boynton Machine Shop, Box 24, Pampa, Texas.

FOR SALE: 60,000 4½ o.d. s.s. line, 60,000 3½ o.d. line all new. 5—55,000 bbl. tanks. 5—10,000 and 5—5,000 tanks. Lundquist Pipe & Supply Co. Phone 5-8850, Tulsa, Okla. P. O. Box 1215.

FOR SALE: U-15 perfect condition. Wonderful buy available only because of health. Cummins L1-600 Engines, Gardner-Denver 16" Pump, 7000' nearly new 4½" Drill Pipe, 16 Drill Collars, 10' Sub-Structure, Steel Floor, Dog House, Change House, Necessary Tools, including Trailer House. If interested in good Rig ready to go, Investigate. Box G-573, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

20,000' of 10¾" O.D. 40½# line pipe P.E. Bev. cut in either 20 of 40' lengths, also 100,000 ft. 8⅝" O.D. 28.55# P.E. Bev. in 40' lengths both machined cleaned. Reasonable for quick sale.

A. A. GILBERT PIPE & SUPPLY CO.
Shreveport, La.

2100' 10¾" OD 31.20# A-53 New Smls Pipe PE SRL
2000' 8⅝" OD 24.70# Ditto
1200' 5⅝" OD 14.62# Ditto
900' 10¾ OD 40.48# A-53 New LW Pipe PE SRL

Pipe is National and Spang located at Wichita.

FRANK MORRIS AND COMPANY
424 South Cheyenne St., Tulsa, Oklahoma
Telephone 2-8247

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Buy NOW
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Early shipment direct from mills
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New and Used material—Immediate delivery from stock, Angles, Channels, I and W.F. Beams, especially for construction needs.

H BEAMS PILE SECTIONS

Phone or Wire your steel requirements.

We are also interested in purchasing your surplus material. We assure you our prices will be the best obtainable.

CARSAND STEEL CORP.
14-23 34th Avenue
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Astoria 8-4484 8-8023

EQUIPMENT FOR SALE

16,000' of 8⅝" OD, 28# & 32# 7,500' of 10¾" OD, 32.75# 7" OD 20#, 23# & N80. All above casing new. 15,000' of 3½" Mod. Drill Pipe. Chapman Pipe & Supply, Box 4232, Ph. ME-81567. Okla. City, Okla.

TWO—Cooper-Bessemer Gas Engines 16"-x20"—165 HP at 180 RPM. Enclosed Case—Two cycle. Two—Farrell-Birmingham Speed Transformers Type SS-1—Size 24-12-200 HP —200 to 2000 RPM. Two—Byron Jackson Centrifugal Pumps. Size 300 GPM Six stage 2000 RPM Head 1560. Equipment second hand in good condition. Spare parts—new. Detroit Southern Pipe Line Co., Hamtramck 12, Michigan.

FOR SALE: 7500' 4½" 16.60# Sonoscoped Drill Pipe 4500' 3½" 13.30# Reg. Drill Pipe. 1—6" x 41' Square Kelly, Rotary, Cable Tool and production equipment. Giffin & Thompson Supply, Hoisington, Kansas. Phone 477.

3—100 KVA 6900/460/230/115 volt 60 cy. Westinghouse Type SK Style #488595 oil transformers—standard accessories. Condition A-1, electrically like new. $699.00 each FOB K.C., Mo. Brundred Oil Corp., 208 Nichols Rd., Kansas City, Mo.—Westport 1866.

FOR SALE: 5—Shriver 42"x42" cast iron Filter Presses, Plate & Frame Type, 27, and 54 chambers 1" cake; 15—Sperry 18"x18" cast iron Filter Presses, 11 chambers; #12 Sweetland Filter for 72 monel covered leaves on 2" centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

MOTOR GENERATOR SETS

Two 50 KW, One 100 KW, 250 volt D.C. 208 volts 3 phase 60 cycle motor. With starter panel. Practically new. Also two 30 KW units. Machinery—Floating Equipment.

EQUITABLE EQUIPMENT CO., INC.
410 Camp St., New Orleans 12, La. U.S.A.
RA-9744

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

USED LINE PIPE FOR SALE

17 miles 10¾" OD Electric Weld 28.04# PE BFW. Approx. length 37'. 51 miles 8⅝" OD Seamless 23.57# PE BFW. Approx. length 35'. 10 miles 6⅝" OD Seamless 17.02# PE BFW. Approx. length 35'. We consider the above first-class merchandise.

BETHLEHEM SUPPLY CO.
Box 2171, Tulsa, Oklahoma
PHONE 5-9261, Ext. 361

FOR SALE

1—37,500 barrel all steel, riveted type tank, completely dismantled. Rivets bucked out for easy assembly. Bottom ¼" thick; first ring 1/16" thick and rings above successively lighter in gauge to 3/16" thickness at the top ring. Sheets are 5' x 15'. $8000.00 FOB, Catlin, Indiana. Immediate shipment.

M. E. FITERMAN CO.
2031 Railway Exchange Bldg.
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Garfield 2677

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OIL WELL CASING for sale: 6600' of 6" od Seamless Casing, 15 lb., Range 2, $1.25 per foot. 2000' of 7" od Seamless Casing, 24 lb., Range 2, $1.45 per foot. Call Mr. Gore, 3-6866—6-9747, Tulsa, Oklahoma.

D-13000 and D-17000 Caterpillar engines skid mounted for driving piston pumps or centrifugal pumps. Located in southern Illinois. Priced for fast sale. Sohio Pipe Line Company, 407 N. 8th St., St. Louis, Mo.

36L BUCYRUS-ERIE Spudder used OS with practically new L525 Buda Engine. Located Shidler, Oklahoma. Contact Wayne King at Shidler or Buckeye Supply Co., El Dorado, Kansas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

—WANTED: Three used 12 cylinder RXIVW LeRoi engines, in good condition, at a bargain. Makin Drilling Company, P.O. Box 1628, Hobbs, New Mexico. Phone 3-3141.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WANTED TO BUY: Used Proportioneers blending equipment or other asphalt blending equipment. The Somerset Refinery, Box 631, Somerset, Kentucky.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

WANTED: Experienced Safety Engineer, for oilwell drilling contractor, with nine (9) rotary rigs operating in West Texas and Southeast New Mexico area. In applying, give age, references, and experience. Reply Box G-496, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEER

Engineering contractor has attractive opening for Senior Processing Engineer experienced in design of all types of refinery equipment with special emphasis on catalytic cracking, reforming and polymerization. Require a man with experience and ingenuity to supervise process activities in young and aggressive concern located in Southern California. Please state age, experience, education and salary expected.

Box G-571
The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEER or CHEMIST

Major Oil Company operating in Venezuela has opening in Production laboratory for Chemical Engineer or Chemist with experience in operation of Podbielniak Column; preferably low temperature Hyd-Robot type. . . .

Experience in operation P.V.T. equipment desirable but not essential.

P. O. BOX #35
Bowling Green Station
New York 4, N. Y.

HELP WANTED

SALES ENGINEER: Familiar with design and sale of gas process equipment—gasoline plants. Box G-549, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURER'S AGENT
to represent manufacturer of oil-field drilling equipment in the Louisiana-Mississippi territory. Write Box G-547, The Oil and Gas Journal, Tulsa, Oklahoma.

MALE TECHNICAL graduate wanted for gasoline testing laboratory in Tulsa, Oklahoma. Forty-hour week with excellent working conditions and liberal employee benefit plans. State experience and salary expectation. Box G-566, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—SURFACE GEOLOGIST

Experienced in surface geology for oil to do some field work and head geology department for U. S. oil company in Israel. Headquarters Jerusalem. Good climate and living conditions. Send application giving full experience record and references to Sidney Schafer & Company, 2200 Welch Avenue, Houston 19, Texas.

ESTIMATORS

Young engineers capable of mechanical estimating for construction of refineries, steam power and similar industrial projects. Must have some field experience. Considerable weight given to ambition, intelligence and interest in estimating and cost analysis.

BECHTEL CORPORATION
220 Bush Street
San Francisco, California

PETROLEUM ENGINEER

as Chief Officer of newly created Montana Commission. Must be thoroughly versed in subsurface geology, production practices, reservoir studies, and be able to supervise field inspectors and manage business of Commission. Dependability and integrity are prime factors. Applicants write full details to Commission for consideration at mid-July meeting.

OIL AND GAS CONSERVATION COMMISSION OF THE STATE OF MONTANA
Box 1122, Great Falls, Montana

WANTED

PRODUCTION SUPERINTENDENT
CHIEF PETROLEUM ENGINEER
EQUIPMENT ENGINEER
RESERVOIR ENGINEER
DRILLING ENGINEER
PRODUCTION FOREMAN
GASOLINE PROCESS ENGINEER
ASSISTANT CHIEF GEOLOGIST
SURFACE GEOLOGIST
SUBSURFACE GEOLOGIST
EXPLOITATION GEOLOGIST

For work on DeMares Concession, Colombia, South America. Excellent salary plus substantial income tax savings. Good living conditions. Two year contract. Annual local vacation and paid vacation to United States if contract renewed. Give details of age, education and experience by letter. All replies held confidential. Reply to Box G-516, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

MANUFACTURER'S AGENT
to represent manufacturer of oil-field drilling equipment in the West Texas territory. Write Box G-548, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY Engineer for small independent company, 30-40 years of age, Project Estimating, Design, Drafting. Give detailed experience and salary expected. Box G-536, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co. Box 2603, Tulsa, Okla. $5.00 cash.

MANUFACTURER'S REPRESENTATIVES WANTED

Exclusive Territories open for Agents to represent Muskogee Iron Works new line of self-lubricating stuffing boxes for pumping wells. Write

MUSKOGEE IRON WORKS
Muskogee, Oklahoma

PETROLEUM ENGINEERS

FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising, testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-5
Arabian - American Oil Company
505 Park Avenue
New York 22, N. Y.

LARGE INDEPENDENT OIL CORPORATION

. . . has openings for three junior engineers who are interested in refining operations. Location of employment will be in large central Oklahoma refinery in a new technical service that is being developed.

These positions involve technical service work in crude distillation; catalytic cracking; gas recovery; polymerization; H-F Alkylation; and delayed coking.

Applicants must be refining, mechanical, or chemical engineering graduates. These are permanent positions with a young, progressive company and offer excellent opportunity for experience and for advancement in an expanding organization. Give details of experience and salary expected.

Box G-567, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box G-556, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: District Superintendent, by aggressive, active and sizable independent oil company. Applicant must be thoroughly experienced in production and well completions. Engineering background and age under 40 desirable. Residence will be in Oklahoma City. This job of opportunity and security carries a good salary, plus other incentives. In letter of application, give complete destails. All replies held in strict confidence. Box G-563, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIGN ENGINEER: Mechanical Design Engineer with 5 to 8 years experience in design of drilling equipment—specifically draw works, rotary tables, and masts. Progressive expanding company, excellent working conditions and benefits. Salary commensurate with experience. REYNOLDS METALS COMPANY, 2000 S. Ninth Street, Louisville, Kentucky.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

PROCESS ENGINEERS

Engineering contractor has openings which offer excellent opportunities for young Process Engineers with background in chemical, refining, or gas & gasoline industries, for permanent position in office located in Tulsa, Oklahoma. One to five years experience is desirable but college education & willingness to assume responsibility are essential. Applicants should write giving age, resume of experience, education and salary expected. Please address Box G-519, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

OFFICE MANAGER, Controller, Executive Assistant desires responsible supervisory position with growing oil company. Rocky Mountain Area preferred. Presently employed by oil refinery on West Coast. Six years extensive experience with emphasis on public and personnel relations with this company. Accounting background. Age 31. Married. Box G-532, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN with three and one-half years experience with major company in West Texas desires position on Texas-Louisiana Gulf Coast. Familiar with lease purchasing, title curing, farmouts, office work, etc. Box G-550, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER—Petroleum Engineering graduate, Texas A. & M. College, Age 35. Over seven years with one company, four years as Sales Engineer of highly specialized oil field equipment. Looking for opportunity with manufacturer or distributor of basic products. Southwestern location desired. Box G-575, The Oil and Gas Journal, Tulsa, Oklahoma.

RESERVOIR Evaluation Engineer, 34, single. Employed by major. Desires position with independent. Seven years office and field experience. Box G-574, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: Chief - Plant - Maintenance—Operating graduate—several years heavy experience. Thoroughly capable steam and electrical generation and distribution—refrigeration and air-conditioning, etc. Installations and maintenance all types and sizes refrigeration and air-conditioning from smallest household to largest process or office building. Go most anywhere, domestic or foreign. State location, salary range, etc. Box G-572, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Thoroughly experienced and trained all phases field operations and office procedures major company land department. Presently assigned to field. College and legal background. Licensed attorney. Location optional. Extensive travel satisfactory. Box G-569, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

CAMP - COMMISSARY - HOTEL - CLUB: General Manager Thoroughly capable in every detail of practical administration from maintenance, laundry, food and liquor purchases, preparation, controls; thorough camp life, organization of social activities and booking entertainment, etc. Long term or permanent—Domestic or foreign. Box G-576, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer, 36, married. Desires responsible position with aggressive independent. Eight years experience. Capable of supervising production, completions, workovers, respressure problems, gas transmission and natural gasoline production. Box G-568, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PILOT, sales and executive potential, desires corporate flying position with future. Commercial, instrument, S&MEL, tower ratings. 33, married, children. Resume on request. H. R. Richards, 2520 NE Saratoga, Portland, Oregon.

GEOLOGIST, near two years experience in subsurface and surface, now employed, wishes to relocate in Southern Gulf Coast area. Box G-570, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No 1628, Ph. No. 3-3141, Hobbs, New Mexico.

GEOPHYSICIST 8 years experience in oil exploration including interpretation, administration, and geological coordination work. Presently employed directing varied geophysical program in South America. Desires responsible position in oil exploration work in eastern USA. Box G-511, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PARTY CHIEF: 5 years experience, B.S. degree in Geophysics. Desires responsible position in oil exploration. Excellent references. Box G-565, The Oil and Gas Journal, Tulsa, Oklahoma.

CONTROLLER, Treasurer, Office Manager, Department Head desires responsible supervisory or administrative position with oil or gas company or service organization. 25 years extensive, diversified experience, domestic and foreign, with major oil companies, including producing, refining and marketing. Accounting and tax background. Widely traveled; speaks Spanish and French. Mature, poised and used to responsibilities. Presently employed in managerial capacity. Highest references. Middle forties; married. Will re-locate. Box G-561, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING DESIGNER, with 15 years diversified refinery & petrochemical plant design experience. Have supervisory background for drawing room or project engineering assignments. Box G-560, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: Age 24, married. B.S. in E.E. 30 hours on M.S. I.E. One year experience. Prefer Mid-Continent or Southwest. Box G-559, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: 8½ years diversified experience in refinery operations and process design with major. Desire position with small independent or engineering firm in South Texas area. Box G-555, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN, five years land and title experience; LLB and BBA degrees; 34 years of age; references furnished. Box G-508, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE: Division Superintendent in charge of drilling and production for large operator in West Texas. Twenty years diversified experience in field operations and management. Available September 1st. Box G-558, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

160 ACRE 9 year Oil and Gas lease by owner, near gas production in Carbon Co., Utah. Bargain, R. O. Barnsley, 950 Lincoln Ave., Palo Alto, Calif.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

CENTRAL KANSAS drilling deals, will farm out or sell interest and drill myself, 1,000 to 4,000 feet. Lewis Short, Burrton, Kansas.

BLOCK of leases in Kay County, Oklahoma, near producing wells, for drilling operations. Full particulars write George Jacques, Uncas, Okla.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

A NEW OIL FIELD—SE NEW MEXICO
As recommended 1st well drilled on D. S. Test showed for 20 b.p.h. Three other fields of like importance to be drilled. Engineering data furnished investors these important areas gratis.
W. J. PETERMAN, Geologist
1918—1953
Portales, New Mexico

PRODUCTION SERVICE

GETTING MORE oil and more pay. Other methods used with our Geochemical. Iroco Laboratory, PO Box 630, Stillwater, Oklahoma.

RANCHES AND FARM LANDS

FOR SALE: Several good ranches in South Dakota, some well improved. Open water and stock dams. Fenced. Plenty of feed and hay. 1000 to 10,000 acres priced $16.00 to $30.00 per acre. Immediate possession. Terms if desired. Address C. H. Mork, Lemmon, South Dakota.

COOL SKY-COUNTRY RANCH: Beautiful ranch, 8,000 ft. high in mountains 38 miles west of Trinidad, Colorado. Perfect for corporation's executive and key employee vacations and customer entertainment. In Las Animas County, adjacent to Monument Lake. Beautiful guest house completely furnished down to linens and deep freeze. All utilities, central heat. Living room 22 x 35 with open fireplace, maple ranch furniture. 2 spacious master bedrooms, each with bath, one with king-size bed, other with 2 double beds. Lovely veranda overlooking Spanish Peaks. Also, foreman's 3-room, 1-bath house. Property completely set up for cattle operation, 5 and 6-wire fence and mile of rail fence, gates, loading chutes, box stalls for horses, etc. About half in improved meadows, all 567 acres grazable. Water rights on three water courses through property. Choice hunting, fishing, plenty trout, deer, other game on place. Has everything for executive use, ready to move in, will consider oil payment from proven properties. Morgan McCall, P.O. Box 748, Ph. 3-3442, Baton Rouge, Louisiana.

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Office Phone	Res. Phone
5-5315	7-4950

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
Industrial—Commercial—Distribution

W. L. Ratcliff	506 Caddo St.
P. O. Box 373	Shreveport, La.

ROYALTIES

PRINCIPAL will buy $100,000.00 to $200,000.00 worth of oil (or gas) royalties that are developed. Will purchase direct from owners or through authorized broker. Prefer a group of interests in several areas. Send 1952 and 1953 income by months. Box G-552, The Oil and Gas Journal, Tulsa, Oklahoma.

IN ELK CITY FIELD, offering royalties ahead of the drill, conditional guarantee with sale, contact owner: A. S. Berry, P. O. Box 1383, Tulsa, Okla.

PRODUCING ROYALTY and overrides for sale. Wire-write-call for particulars. JACK EAGLE, 706 City Natl. Bldg., Okla. City, Okla. REgent 6-7027.

QUICK CASH: Producing royalties, Overrides or Production . . . no delay. Phone 72-4533, Robert L. Kinkaid . . . P.O. Box 26, Tulsa, Oklahoma.

ROYALTIES WANTED
Producing Royalties
High Grade Only
Send Full Particulars
Address
C. C. HARMON
719 World Bldg., Tulsa, Okla.
P.O. Box 2151

REAL ESTATE

FOR LEASE: Attractive, conveniently arranged brick office building, 80' x 34', in downtown Odessa, Texas. Excellent office space for oil company, independent oil operators, equipment company or drilling contractors. For information write Wilson Estate, Box 485, Odessa, Texas, or Telephone 6-6242.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

OFFICE BUILDING

Shreveport, La.

Approximately 15,000 square feet of floor space available at edge of downtown Shreveport. Will remodel completely for tenant on long term lease; or lease on favorable terms so tenant can improve and remodel to fit his needs.

Ideally suited for oil or gas company district office.

Write: 1313 Slattery Bldg.

SHREVEPORT, LA.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that approximately 1017 acres of land in T. 17 S., R. 28 E., N.M.P.M., within the known geologic structures of the Pecos Valley field and Red Lake field, New Mexico, will be offered in four separate parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p. m., Eastern Standard Time, July 22, 1953, when bids will be opened. Details of the lease offering, how and where to submit bids, and a description of the lands may be obtained upon request from the Manager of the Land and Survey Office, Santa Fe, New Mexico, or from the Bureau's Washington office. Edward Woozley, Administrator.

American Iron Announces Sales Department Changes

W. T. BIDDLE

Following are changes and additions to the sales force as recently announced by American Iron & Machine Works Co. of Oklahoma City. W. T. (Dusty) Biddle has been appointed district sales manager for the Rocky Mountain area for American Iron. His headquarters will be in Casper, Wyo. Frank Proctor has recently joined the sales organization and will specialize in the promotion of production equipment. Walt McCharon has recently been transferred from Odessa to Abilene, Tex.

FRANK PROCTOR

W. McCHARON

Biddle attended University of Oklahoma, graduating in 1948 with a degree in petroleum engineering. Before starting with American Iron in 1952, he worked for several major oil companies in general field work, engineering, and sales.

Proctor has 5 years of college at University of Texas. Since his discharge from the Air Force, he has been associated with Larkin Packer Co., Inc., Brown Oil Tools, Inc., in sales work representing both in North and West Texas areas. For American Iron, Proctor will make his headquarters at Abilene, Tex., and will serve the West, Central and North Texas areas. McCharon worked in the engineering department of American Iron before being transferred to Odessa by the same department in 1950.

National Extends Dailey's District to Michigan

The territory of R. L. Dailey, district manager of The National Supply Co., has been extended to include the Michigan district, in addition to the Illinois district.

Dailey will make his headquarters at Toledo. He will handle special sales activities in Chicago, St. Louis, and Findlay, Ohio.

R. T. Harris will assist Dailey in the Illinois district, with headquarters at Olney, and G. H. Shumaker in the Michigan district, with headquarters at Mount Pleasant.

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SASKATCHEWAN

British-American-Husky-Phillips 1 Davin, LSD 12, 11-16-16w2. Dry. TD 3,355 ft.

Socony-Sohio 1 Estlin, LSD 1, 20-15-19w2. Dry. 4,555 ft.

Superior-Bata et al 3 Manito, LSD 6, 2-42-28w3. Dry. TD 2,512 ft.

Imperial-McCarty & Coleman 15-31 Masefield, LSD 15, 31-2-14w3. Dry. TD 4,400 ft.

Tide Water-Success 1 Crown, LSD 16, 20-17-15w3. Dry. TD 4,002 ft.

Williston Oil & Gas-Swift Current 4-19 Harlow, LSD 4, 19-15-13w3. Dry. TD 5,310 ft.

Bennett, Burns & Ben L. Young 1 Bell, LSD 11, 19-5-14w2. Dry. TD 5,050 ft.

Souris Valley-Anglo-Calmont 1-4 Smart, LSD 4, 1-1-26w1. Dry. TD 3,641 ft.

ALBERTA

Bay-Kroy 4-24 South Camrose, LSD 4, 24-46-20w4. Indicated Viking sand oil well. TD 4,200 ft. PBTD 3,293 ft.

Gulf 3 Kerbes, LSD 4, 36-36-21w4. Dry. TD 6,070 ft.

Superior et al 14-34 Handhills, LSD 14, 34-29-15w4. Dry. TD 5,010 ft.

Johnson 5 Kehiwin Well, LSD 9, 21-59-6w4. Dry. TD 1,325 ft.

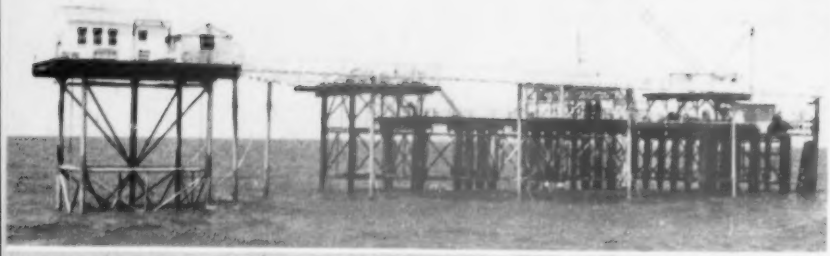
Britalta-Deep Rock 16 Many Island, LSD 7, 27-14-1w4. Bow Island gas well (extension). TD 1,645 ft.

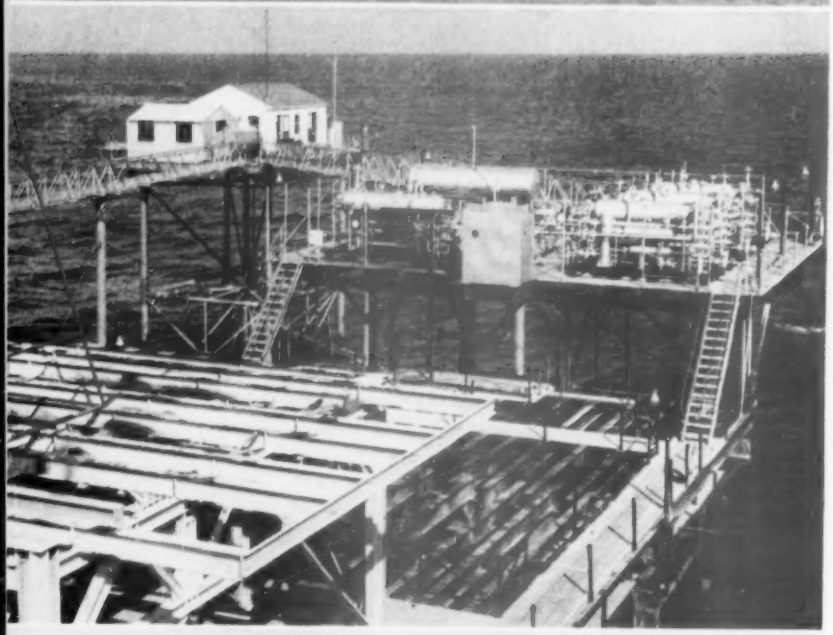
Imperial 16-24 Pinedale, LSD 16, 24-54-17w4. Dry. TD 2,957 ft.

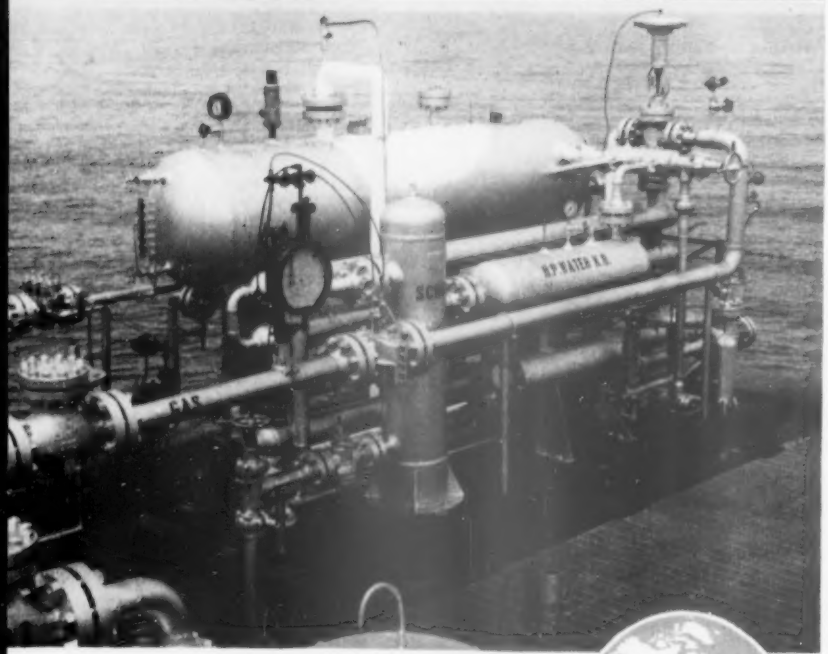
Husky 3 Vanesti, LSD 9, 5-48-3w4. Dry. TD 2,266 ft.

Western-Calvin 6-35 Redwater, LSD 6, 35-34-10w4. Dry. TD 3,677 ft.

Western-Redwater-Merrill 5-28 Calvan, LSD 5, 28-34-10w4. Dry. TD 3,830 ft.







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Eight miles off the coast of Vermillion Parish, Louisiana, in 40 feet of Gulf water, stands the first "ocean going" gas gathering line. Four directionally drilled gas-condensate wells are produced. Liquid is separated AT THE WELL.

The following standards for the separation equipment were set by the producing company:

1. Take shutin pressure of 3000 p.s.i. and step down to 1200 p.s.i. for pipe line.
2. Processed gas could contain no more than 14 lbs. water per MM cu. ft. with 7 lbs. preferred.
3. Separate maximum amount of distillate and free water.
4. Individual units for each well with minimum capacity of 10 MM cu. ft./day.
5. Added safety equipment to automatically shut in wells in event of disturbance.
6. Units had to be compact and complete with a mud and sand trap along with gas and distillate meter runs.

National equipment exceeded these specifications. NATIONAL LTX UNITS WERE CHOSEN.

First gas began to flow in early 1951 WITH A REMARKABLY LOW WATER CONTENT OF 4 LBS. PER MM CU. FT. OF GAS.

May we help you in solving your distillate extraction problems? Write for a paper covering full description of this installation.

*TM Reg. U.S. Pat. Off.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

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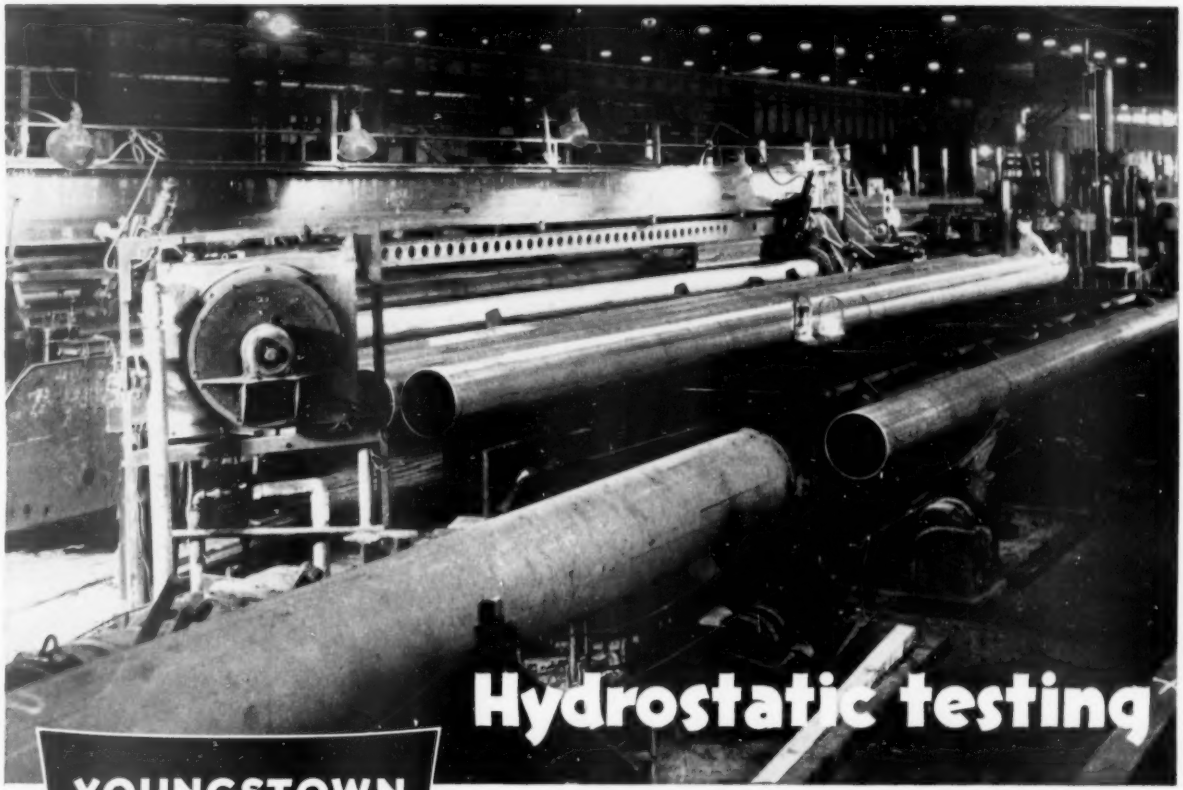

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Youngstown Electric Weld Pipe for the oil and gas industry is being made in sizes up to 22" OD and in grades as high as X52. For further information, phone or write our nearest District Sales Office.

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